4.0 CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

This chapter provides an evaluation of the potential effects or impacts of each of the alternatives on the resources described in Chapter 3.

4.1 Impact Criteria

Summary impact levels (characterized as negligible, minor, moderate, or major) are given for each impact topic and are based on the intensity, duration, and context of the impact. Definitions are provided below:

Duration of Impact:

Temporary: Impact would occur during the proposed activity only. Once the activity has ended, resource conditions are likely to return to pre-activity conditions.

Long-term: Impacts would extend from several years up to the life of the plan.

Permanent: Impacts are a permanent change in the resource that would last beyond the life of the plan even if the actions that caused the impacts were to cease.

Context of Impact:

Common: The affected resource is not identified in enabling legislation and is not rare either within or outside the park. The portion of the resource affected does not fill a unique role within the park or its region of the park.

Important: The affected resource is identified by enabling legislation or is rare either within or outside the park. The portion of the resource affected does not fill a unique role within the park or its region of the park.

Unique: The affected resource is identified by enabling legislation and the portion of the resource affected uniquely fills a role within the park or its region of the park.

Intensity of Impact:

Low: A change in a resource condition is perceptible, but it does not noticeably alter the resource's function in the park's ecosystem, cultural context, or visitor experience.

Medium: A change in resource condition is measurable/observable and an alteration to the resource's function in the park's ecosystem, cultural context, or visitor experience is detectable.

High: A change in a resource condition is measurable/observable and an alteration to the resource's function in the park's ecosystem, cultural context, or visitor experience is clearly and consistently observable.

Overall Summary Impact Levels

Summaries about the overall impacts on the resource synthesize information about intensity, duration, and extent, which are weighed against each other to produce a final assessment. While each summary reflects a judgment call about the relative importance of the various factors involved, the following descriptors provide a general guide for how summaries are reached.

Negligible: Impacts are generally low intensity, temporary, and do not affect unique resources.

Minor: Impacts tend to be low intensity or of short duration, although common resources may have more intense, longer-term impacts.

Moderate: Impacts can be of any intensity or duration, although common resources are affected by higher intensity, longer impacts while unique resources are affected by medium or low intensity, shorter-duration impacts.

Major: Impacts are generally medium or high intensity, long term, or permanent, and affect important or unique resources.

4.2 Cumulative Impacts

Cumulative impacts were assessed by combining the potential environmental impacts of the alternatives with the impacts of known projects that have occurred in the past, are currently occurring, or are reasonably foreseeable future actions. This analysis focuses on actions that have occurred since NPS acquisition of the site in 1998. In a memorandum issued on June 24, 2005 providing guidance on the consideration of past actions in cumulative effects analysis, the Council on Environmental Quality (CEQ) states: "The environmental analysis required under NEPA is forward-looking, in that it focuses on the potential impacts of the proposed action that an agency is considering. Thus, review of past actions is required to the extent that this review informs the agency decision making regarding the proposed action."

Extensive mining at four upper mountain mine sites and associated land development and disturbance occurred in and around the NHL from 1901 to 1938. These actions, undertaken at a time when measures to protect the environment were all but non-existent, caused widespread, long-term impacts in the McCarthy-Kennecott area on soils, water resources, hydrology and floodplains, and vegetation, among other resources. These conditions are documented in Chapter 3, Affected Environment. Because the effects of past mining does not continue to change the current environment and reversing the effects of past mining is inconsistent with the management of the area as a National Historic Landmark, only cumulative effects of past actions occurring after NPS acquisition will be assessed.

Past, present, and reasonably foreseeable future projects and actions in the vicinity of the project site are described below.

4.2.1 Past and Present Projects and Actions

Past NPS Activities:

Cultural Resources: Stabilization work accomplished to date on all NPS-owned historic structures is described on pp. 28 – 40 of this Environmental Assessment, under the headings "*What has been done".* Work has focused on stabilization and, in some cases, adaptive re-use of historic structures. Stabilization and/or rehabilitation has been done on the General Manager's Office, Hospital, Railroad Depot, Company Store, railroad trestle, Tram Terminus, Leaching Plant, Machine Shop, Power Plant, Transformer House, Refrigerator plant, West bunkhouse, New Schoolhouse, Recreation hall, Old schoolhouse, Dairy barn, East bunkhouse, South Silk Stocking cottage, and North Silk Stocking cottage. While these actions have a direct positive impact on the historic structures, there is sometimes a negative impact on the cultural landscape. For example, stabilization of historic structures requires removal of adjacent tailings, wood scatters, and archeological features. While inventoried and documented during the removal process, loss of these features constitutes a negative impact on the cultural landscape. Another example would be the loss of the assay building. This building was impacted by National Creek flooding in 2006. The building

was removed to facilitate stabilization of National Creek in order to protect other historic structures from future flooding.

Soils: Soils in and near the Kennecott Mill Town and in the town of McCarthy have been altered due to construction of buildings, roads, trails, and other facilities and from accumulation of tailings and oil-stained soil. Past mining at the higher elevation mine sites has also resulted in soil impacts. Besides the actual footprint of these facilities, soils in the immediate surrounding areas have been impacted by compaction from pedestrian and vehicle traffic. Dispersed soil impacts have also been caused by off-trail pedestrian traffic that has resulted in compaction over broad areas and erosion on steeper slopes. Concentrated areas of compaction and erosion often take the form of social trails.

NPS actions since acquisition have focused on removal of hazardous materials, which has resulted in a positive effect to area soils. Historic structure stabilization has resulted in excavation around building foundations and some landscape alteration and soil compaction to accommodate site access. These actions have resulted in long-term and moderate impacts to soils within the NHL.

Hazardous materials: Hazardous materials (i.e. asbestos, mine tailings, lead paint, batteries) present a source of contamination to groundwater and surface water and potential impact to aquatic biota. These materials have existed in the NHL for over 50 years, and leaching from these sources in the past and into the future is a continuing cumulative impact. Since NPS acquisition of the NHL in 1998, actions have been taken to clean up hazardous materials, including fuel releases, lubricant oil and greases, lead-based paints, and asbestos, consistent with the 1999 work plan and agreement between NPS and Alaska Department of Environmental Conservation. These actions have resulted in a positive impact to area soils, surface, and groundwater.

Water Resources: During the Kennecott mining era, National Creek and its floodplain were intensively altered by mining activity and material stockpiling. These alterations caused hydrologic and hydraulic changes in the fluvial system, floodplain, and wetlands that are evident today. In the vicinity of the mill, the stream channel was confined, dammed and diverted to support milling operations. Water diversion facilities were constructed upstream of the mill. Remnants of these facilities remain, causing blockage and flow restriction during floods. Dams, buildings, and mill tailings in the active floodplain are subject to scour and sediment deposition. Stream gravel has been deposited in the lower levels of buildings along National Creek. National Creek now has an abundance of both naturally occurring and mining-related debris and sediment accumulation (NPS, 2003b).

Other floodplains in the project area have been disturbed in the past, causing altered water flow. Actions included diverting stream channels away from infrastructure and installing culverts.

Since acquisition of the NHL in 1998, NPS actions have focused on re-channelization of National Creek in order to minimize flooding potential and minimize damage to adjacent historic structures. These actions have had a positive impact on stabilization of the stream channel. Work on adjacent historic structures (such as the railroad trestle) has had short-term negative impacts on water quality in National Creek. NPS and other local landowners utilize National Creek for potable water, an activity that has a negligible effect on water quality and quantity.

Vegetation: Vegetation clearing in the McCarthy-Kennecott area has resulted from construction and maintenance of the McCarthy road and construction of facilities along the road. Vegetation in and near the Kennecott Mill Town and in the town of McCarthy has been cleared for construction of buildings, roads, trails, and other facilities and invasive species have been introduced.

Past mining at the higher elevation mine sites has also resulted in vegetation impacts. Besides the actual footprint of these facilities, plants in the immediate surrounding areas have been impacted by trampling

from pedestrian and vehicle traffic. Dispersed vegetation impacts have also been caused by off-trail pedestrian traffic. Concentrated areas of pedestrian traffic often take the form of unofficial social trails where vegetation is often denuded. An additional impact to the vegetation of the area includes a bark beetle infestation in the 1990s which killed many of the mature white spruce trees on the terraces, side slopes and uplands.

Most of the areas where vegetation was historically cleared have stabilized and revegetated on their own to some degree. Before 1900, most areas of the NHL were in some successional stage of white spruce forest, except notably in the vicinity of National Creek. Today there is more total vegetation cover than at any time since the start of the mining era. This is due to the ongoing retreat of the Kennicott Glacier and the consequent colonization of its lateral moraines. All the vegetation in the NHL is a seral stage of white spruce forest, as it was before the miners arrived. However, a larger proportion of vegetated land is in early to middle succession than it was 100 years ago, and a smaller percentage is in late successional or mature forest.

Since acquisition, NPS activities that have affected vegetation include vegetation clearing associated with historic structure stabilization, vegetation clearing to facilitate new visitor developments (such as the shuttle turnaround), vegetation removal and thinning for wildland fire protection around historic structures, and invasive species removal. These activities have had a temporary, medium-intensity impact on a common park resource. These have resulted in a minor impact to vegetation.

Past Subdivision, Development, and other factors: In 1976, the Great Kennicott Land Company acquired rights to the lower half of Consolidated Wrangell's property. Taking advantage of increased visitation and tourism in the area, the Land Company proceeded to subdivide the property for sale to the public. In the mill town, a lot was assigned to practically each building. The dairy barn, schoolhouse, and generator shed were all adaptively reused for seasonal accommodations. Renovations to the apartment house transformed it into the Kennicott Glacier Lodge. Burned to the ground in 1983, the lodge was rebuilt in 1987 and later enlarged with a new south wing.

At the formation of Wrangell-St. Elias National Park and Preserve in 1980, Kennecott remained in private ownership. Establishment of the park nevertheless revitalized McCarthy as a tourist center. This increased tourism and visitation to the concentrator and mines, as did Kennecott's designation as a National Historic Landmark in 1986. The looting of portable artifacts and reuse of a variety of construction materials also stemmed from increased visitation. Natural forces have, however, proved equally if not more destructive. The 1964 earthquake felled tram towers and caused slippage of the tailing banks behind the West Bunkhouse. Flood damage caused by the bursting of the National Creek dam in 1980, and again in 1983 and 2006, recontoured the central part of the mill town and deposited large volumes of silt through the National Creek bunkhouses, hospital, and assay shed. The 2006 event destroyed the assay shed. The destruction of boardwalks and fire-hose casings in the National Creek area respectively eliminated indications of previously well-defined circulation and Kennecott's care in meeting fire insurance stipulations. West of the rail trestle, flooding ruptured the tailings crib and deposited tailings further down-slope. In the process, waste removal systems exiting into National Creek (such as flumes and pipes) sustained major damage.

Both natural and cultural agents have contributed to the general deterioration of the mill town. The sawmill, oil house (west of the power plant), and almost all privies have entirely collapsed. The laundry building was demolished in the late 1970's as a hazard. Fallen wood siding surrounds the mill building and the southern end of the leaching plant. Decking between structures has fallen into disrepair. Vegetation, primarily alder and willow, encroaches upon buildings and formerly barren hillsides, particularly in the central part of the site and northeast mill town area, obscuring both historic landscape features (such as gardens) and vistas (such as the general approach to the mill town and view from the

National Creek footbridge). More importantly, overgrowth in the National Creek area has entirely removed indications of its central function to Kennecott's operation.

4.2.2 Future Projects and Actions

The following reasonably foreseeable future actions have potential for interacting with the proposed action to produce cumulative impacts. These include actions that could occur on non-NPS lands in the area.

McCarthy Road upgrades: AKDOT will continue to upgrade the McCarthy Road. Upgrades will include brushing, widening, and resurfacing on some segments.

University of Alaska Lands: Additional University lands in the McCarthy area have been surveyed but not sold. These lands may become available in the future for sale or lease.

Private subdivision lots in the Kennecott millsite: Private lots may change hands and currently undeveloped lots may be developed.

Park visitation: NPS estimates approximately 12,000 visitors annually to the McCarthy/Kennecott area. Future trends are dependent on area transportation. McCarthy road upgrades will likely result in an upward trend in visitation to the area.

4.3 Water Resources

4.3.1 Alternative 1, No Action

Direct and Indirect Effects: Under the No Action Alternative, no new actions are planned that would contribute negative impacts to water resources. However, the lack of action to improve existing facilities could lead to adverse impacts on water resources.

There would be no improvement of existing trails or circulation routes under this alternative. The cut bank washout that currently exists on the old Wagon Road just south of National Creek would not be repaired and several existing trails are overgrown and in poor condition. Increased sediment loads from erosion of these trails could degrade the surface water quality of National Creek and other nearby streams. Given the high sediment load that exists naturally in National Creek (see Chapter 3), this would be considered a low-intensity impact of temporary duration.

Lack of sufficient public toilets on the north side of the NHL, specifically along the Root Glacier trail, could lead to surface water contamination with fecal coliform bacteria from improper disposal of human waste near streams. This would be considered a medium-intensity impact of temporary duration, affecting an important public resource within the NHL.

Under the No Action alternative, there would be no monitoring or control of invasive plant species. Existing infestations would be expected to spread. White sweetclover and other invasive plant species that have been documented in the NHL have been shown to have adverse impacts on watersheds. A 2011 study done on three Alaskan glacial rivers showed that white sweetclover at moderate to low densities may facilitate establishment of exotic species, and at high densities can reduce the cover and density of both exotic and native species (Conn et. al., 2011).

Under the No Action alternative, there would be no attempt at education or regulation of recreational ORV use. Without education of this user group, recreational ORV use in the area would be expected to increase. Increased recreational ORV use up the Jumbo trail could lead to impacts in the headwaters of Bonanza Creek. Some increased and sediment runoff would be expected for trail routes that cross or are very near streams. The dispersion of increased suspended sediment in the short term from trail-stream crossings is fairly limited based on some Alaskan studies (Meyers et al. 2007, and Rinella and Bogan 2003). They found that most extended increase in turbidity occurred within about 10 to 30 meters of an ORV crossing, with little or no observed change at 100 meters from a crossing in most cases. Also effects on benthic organisms appeared to be limited in a similar fashion (Rinella and Bogan, 2003). During seasonal high flows sediment would disperse further downstream, both as suspended sediment, and larger particles as bed load, which would occur in a period of normally elevated sediment levels in streams, reducing its effect. Based on these factors, impacts to water resources from ORV trail use would be considered temporary in duration, low in intensity, but occurring to an important area resource.

Because the impacts described above are generally temporary in nature and low intensity, the overall direct and indirect impacts to water resources are minor.

Cumulative Effects: Past impacts to area water resources described in section 4.2.1 of this document have had a long-term positive impact on stream channel stability in National Creek.

The following reasonably foreseeable actions could affect water resources:

Private subdivision lots in the Kennecott millsite: Private lots may change hands and currently undeveloped lots may be developed. Depending on the proximity to area streams, private development

can impact water resources through land clearing, potential erosion, and proximity of outhouses or septic systems.

Park visitation: NPS estimates approximately 12,000 visitors annually to the McCarthy/Kennecott area. Future trends are dependent on area transportation. McCarthy road upgrades will likely result in an upward trend in visitation to the area. Increased visitation to Kennecott without improvement of the current availability or quality of toilets could result in an increase of human waste deposited near streams.

These reasonably foreseeable actions contribute a moderate negative impact to water resources in the NHL because of the potential for impacts to water quality that could directly affect the availability of drinking water to some area residents. The cumulative impact of this alternative plus these past, present, and reasonably foreseeable actions would be moderate.

Conclusion: Direct and indirect effects of Alternative 1 on water resources would be minor because of the temporary duration and low intensity of the impacts. However, combined with past, present, and reasonably foreseeable actions, impacts to water resources are moderate.

4.3.2 Alternative 2, Proposed Action

Direct and Indirect Effects: Under this alternative, historic structures would be managed to reflect a diversity of treatments. Some structures would be managed as ruins and allowed to deteriorate in place, some would be stabilized and preserved, and some would be rehabilitated to accommodate adaptive re-use. Detailed proposals for building stabilization are described on pp. 22 – 40 of this EA. Some historic structure stabilization efforts require the use of heavy equipment. Any equipment with tracks or exceeding 50 tons cannot use the railroad trestle for crossing National Creek and must utilize a low water crossing just east of the trestle. Operation of heavy equipment through or around National Creek contributes some sedimentation to the creek. Because of the naturally high sediment level in National Creek, this is a low intensity and temporary impact.

In 2010, National Creek was re-channelized in order to prevent future flooding and further damage to historic structures along the creek. Engineering for stream re-channelization identified the need for the periodic removal of sediment. Removal will require periodic excavation from the stream bed to retain its current configuration. Excavation will require the use of heavy equipment such as backhoes and dump trucks. This operation, while removing deposited sediments and gravels, would also release large amounts of suspended sediments downstream. Because of the naturally high sediment level in National Creek and the position of this activity in the watershed, this is a low intensity and temporary impact.

Vegetation clearing is proposed around historic structures in order to reduce fire hazard and some limited vegetation clearing is proposed to enhance viewsheds. Vegetation clearing reduces plant cover and exposes soils to rainfall and runoff, thereby increasing the likelihood of soil erosion and potential sedimentation into adjacent streams. However, proposed clearing would leave herbaceous shrubs and grasses in place and would occur on such a small scale that impacts would be considered low in intensity, and long-term in duration. Revegetation of native species may occur along watersheds which would increase bank stability.

Invasive plant species management would be consistent with the 2010 Alaska Region Invasive Plant Management Plan. For the Kennecott/McCarthy area this would include monitoring and the use of physical control. If infestations are resistant to physical control, spot treatments of herbicides would be considered based on risk analysis considering factors such as proximity to vegetation harvested by humans; the likelihood of affecting sensitive fish or wildlife habitat; and the likelihood of affecting watershed drinking water. Herbicide use would be subject to mitigation measures identified in Appendix H of this EA. The effects analysis for water resources described in the 2010 NPS Alaska Region Invasive

Plant Management Plan and EA is incorporated into this EA by reference. The 2010 EA found that the preferred alternative would have a minor impact on water resources and that "the short-term adverse effects of herbicides used to reduce or eliminate unwanted invasive plants will be outweighed by the long-term beneficial effects on native plant species and ecosystem integrity and wetlands and floodplain functions." (NPS, 2010).

Improvements to existing circulation routes (such as the cut-bank washout on the old Wagon Road just south of National Creek) should stabilize the washout and minimize sedimentation into National Creek from that site. This alternative proposes a 3.5 mile pedestrian trail to the NHL from the footbridge over the east (dry) fork of Kennicott River. This trail would follow the glacial moraine and require minimal tread construction. On the north end, the trail would tie in with the old Wagon Road, so a crossing of National Creek would not be required. Any impacts to water resources from construction or pedestrian use of this trail would be temporary in nature and low intensity.

Installation of a vault toilet north of the NHL along the Root Glacier trail and relocation/reconstruction of the existing Jumbo Creek outhouse would minimize surface water contamination with fecal coliform bacteria from improper disposal of human waste near streams.

Because the impacts described above are generally temporary in nature and low intensity, the overall direct and indirect impacts to water resources are minor.

Cumulative Effects: Past impacts to area water resources described in section 4.2.1 of this document have had a long-term positive impact on stream channel stability in National Creek.

Reasonably foreseeable actions that could affect water resources are described below:

Private subdivision lots in the Kennecott millsite: Private lots may change hands and currently undeveloped lots may be developed. Depending on the proximity to area streams, private development can impact water resources through land clearing, potential erosion, and proximity of outhouses or septic systems.

Park visitation: NPS estimates approximately 12,000 visitors annually to the McCarthy/Kennecott area. Future trends are dependent on area transportation. McCarthy road upgrades will likely result in an upward trend in visitation to the area. Benefits associated with the proposed water system (flush toilets at the Company Store and availability of potable water) and the installation of a vault toilet along the Root Glacier trail would mitigate potential impacts to water quality from increased visitation.

These reasonably foreseeable actions contribute a minor negative impact to water resources in the NHL. The cumulative impact of this alternative plus these past, present, and reasonably foreseeable actions would be minor.

Conclusion: Direct and indirect effects of Alternative 2 on water resources would be minor because of the temporary duration and low intensity of the impacts. Combined with past, present, and reasonably foreseeable actions, impacts to water resources are minor.

4.3.3 Alternative 3, Management Concepts

Direct and Indirect Effects: Under this alternative, most historic structures would be managed within the "preservation" class of the *Secretary of Interior's Standards for Treatment of Historic Properties.* Treatments would emphasize interior stabilization and (where necessary) re-roofing, but would not include re-painting or window replacement. Detailed proposals for building stabilization are described on pp. 49 - 53 of this EA. Some historic structure stabilization efforts would require the use of heavy equipment. Any equipment with tracks or exceeding 50 tons cannot use the railroad trestle for

crossing National Creek and must utilize a low water crossing just east of the trestle. Operation of heavy equipment through or around National Creek contributes some sedimentation to the creek. Because of the naturally high sediment level in National Creek, this is a low intensity and temporary impact.

In 2010, National Creek was re-channelized in order to prevent future flooding and further damage to historic structures along the creek. Engineering for stream re-channelization identified the need for the periodic removal of sediment. Removal will require periodic excavation from the stream bed to retain its current configuration. Excavation will require the use of heavy equipment such as backhoes and dump trucks. This operation, while removing deposited sediments and gravels, would also release large amounts of suspended sediments downstream. Because of the naturally high sediment level in National Creek and the position of this activity in the watershed, this is a low intensity and temporary impact.

Vegetation clearing is only proposed under this alternative in association with maintaining existing circulation routes. There would be no impacts to water resources associated with these activities.

The NHL would continue to be monitored for invasive plants and populations of such would be manually removed, with no use of herbicides. Physical control of existing invasive plant infestations in the area should result in control and containment of invasive plant species. If not, moderate to low densities of invasive species (specifically white sweetclover) may facilitate establishment of exotic species in riparian areas, and at high densities can reduce the cover and density of both exotic and native species (Conn et. al., 2011). This could result in long-term and medium intensity impacts to riparian areas.

Improvements to existing circulation routes (such as the cut-bank washout on the old Wagon Road just south of National Creek) should stabilize the washout and minimize sedimentation into National Creek from that site. This alternative proposes a 3.5 mile pedestrian trail NPS will construct a 3.5 mile pedestrian trail to the NHL from the footbridge over the east (dry) fork of Kennicott River. This trail would follow the glacial moraine and require minimal tread construction. On the north end, the trail would tie in with the old Wagon Road, so a crossing of National Creek would not be required. Any impacts to water resources from construction or pedestrian use of this trail would be temporary in nature and low intensity. This alternative explores the potential for other pedestrian trails in the area. Design and construction of these trails would need to considered in another NEPA compliance document, but some of the proposed trails would require brushing, tread construction, and creek crossings.

Under this alternative, no improved water system would be designed or constructed. The focus would be on looking at solar as an alternative means of supplementing diesel powered generators. A vault toilet would be installed north of the NHL along the Root Glacier trail and the existing Jumbo Creek outhouse would be relocated/reconstructed. These actions would minimize surface water contamination with fecal coliform bacteria from improper disposal of human waste near streams.

Because the impacts described above are generally temporary in nature and low intensity, the overall direct and indirect impacts to water resources are minor.

Cumulative Effects: Past impacts to area water resources described in section 4.2.1 of this document have had a long-term positive impact on stream channel stability in National Creek.

The following reasonably foreseeable actions could affect water resources:

Private subdivision lots in the Kennecott millsite: Private lots may change hands and currently undeveloped lots may be developed. Depending on the proximity to area streams, private development can impact water resources through land clearing, potential erosion, and proximity of outhouses or septic systems.

Park visitation: NPS estimates approximately 12,000 visitors annually to the McCarthy/Kennecott area. Future trends are dependent on area transportation. McCarthy road upgrades will likely result in an upward trend in visitation to the area. Increased visitation to Kennecott without improvement of the current availability or quality of toilets could result in an increase of human waste deposited near streams.

These reasonably foreseeable actions contribute a moderate negative impact to water resources in the NHL because of the potential for impacts to water quality that could directly affect the availability of drinking water to some area residents. The cumulative impact of this alternative plus these past, present, and reasonably foreseeable actions would be moderate.

Conclusion: Direct and indirect effects of Alternative 3 on water resources would be minor because of the temporary duration and low intensity of the impacts. However, combined with past, present, and reasonably foreseeable actions, impacts to water resources are moderate.

4.3.4 Alternative 4, Restoration

Direct and Indirect Effects: Under this alternative, historic structures within the Administrative Core zone would be restored or reconstructed to replicate 1938 conditions. Detailed proposals for building stabilization are described on pp. 59 - 64 of this EA. The restoration and reconstruction of the Staff House, Stephen Birch house, and Manager's residence, which currently no longer exist, would require the use of heavy equipment for extensive site preparation. Site preparation and leveling for all three of these locations would be uphill and close to National Creek. These activities would result in some sedimentation into National Creek. Additionally, any equipment with tracks or exceeding 50 tons cannot use the railroad trestle for crossing National Creek and must utilize a low water crossing just east of the trestle. Operation of heavy equipment through or around National Creek contributes some sedimentation to the creek.

In 2010, National Creek was re-channelized in order to prevent future flooding and further damage to historic structures along the creek. Engineering for stream re-channelization identified the need for the periodic removal of sediment. Removal will require periodic excavation from the stream bed to retain its current configuration. Excavation will require the use of heavy equipment such as backhoes and dump trucks. This operation, while removing deposited sediments and gravels, would also release large amounts of suspended sediments downstream. The combined effect of the activities described in the last two paragraphs, while temporary in duration, would have a measurable effect on the resource condition of National Creek and would result in medium intensity impact.

Extensive vegetation clearing is proposed in the Administrative, Commercial, and Industrial Zones of the NHL, in order to replicate 1938 conditions. Vegetation clearing on this scale would eliminate plant cover and expose soils to rainfall and runoff, thereby resulting in soil erosion and sedimentation into National Creek. This would result in long-term and medium intensity impacts to National Creek.

Invasive plant species management would be consistent with the 2010 Alaska Region Invasive Plant Management Plan. For the Kennecott/McCarthy area this would include monitoring and the use of physical control. If infestations are resistant to physical control, spot treatments of herbicides would be considered based on risk analysis considering factors such as proximity to vegetation harvested by humans; the likelihood of affecting sensitive fish or wildlife habitat; and the likelihood of affecting watershed drinking water. Herbicide use would be subject to mitigation measures identified in Appendix H of this EA. The effects analysis for water resources described in the 2010 NPS Alaska Region Invasive Plant Management Plan and EA is incorporated into this EA by reference. The 2010 EA found that the preferred alternative would have a minor impact on water resources and that "the short-term adverse effects of herbicides used to reduce or eliminate unwanted invasive plants will be outweighed by the long-

term beneficial effects on native plant species and ecosystem integrity and wetlands and floodplain functions." (NPS, 2010).

Improvements to existing circulation routes (such as the cut-bank washout on the old Wagon Road just south of National Creek) should stabilize the washout and minimize sedimentation into National Creek from that site. This alternative proposes a 3.5 mile pedestrian trail NPS will construct a 3.5 mile pedestrian trail to the NHL from the footbridge over the east (dry) fork of Kennicott River. This trail would follow the glacial moraine and require minimal tread construction. On the north end, the trail would tie in with the old Wagon Road, so a crossing of National Creek would not be required. Any impacts to water resources from construction or pedestrian use of this trail would be temporary in nature and low intensity.

Under this alternative, a water system would be designed and constructed to provide potable water for visitor use and for NPS facilities in Kennecott milltown. The water system would also provide water for limited fire suppression (sprinkler systems) in some historic structures. At this time, NPS is still exploring the potential for the use of groundwater as the source of water for a new system. Once NPS has enough information to consider design alternatives, a project-specific EA will be done considering site-specific effects on water resources.

This alternative also proposes alternative energy focusing on development of a hydroelectric system. The water resource demands associated with such a system are not yet known, so specific direct and indirect impacts are not displayed here. Effects of a hydroelectric system are considered under cumulative impacts (reasonably foreseeable actions).

Installation of a vault toilet north of the NHL along the Root Glacier trail and relocation/reconstruction of the Jumbo Creek outhouse would minimize surface water contamination with fecal coliform bacteria from improper disposal of human waste near streams.

The impacts described above vary from temporary in nature and low intensity to long-term and medium intensity. Because impacts would have a measurable effect on an important resource condition, impacts to water resources would be considered moderate.

Cumulative Effects: Past impacts to area water resources described in section 4.2.1 of this document have had a long-term positive impact on stream channel stability in National Creek.

The following reasonably foreseeable actions could affect water resources:

Private subdivision lots in the Kennecott millsite: Private lots may change hands and currently undeveloped lots may be developed. Depending on the proximity to area streams, private development can impact water resources through land clearing, potential erosion, and proximity of outhouses or septic systems.

Park visitation: NPS estimates approximately 12,000 visitors annually to the McCarthy/Kennecott area. Future trends are dependent on area transportation. McCarthy road upgrades will likely result in an upward trend in visitation to the area. Benefits associated with the proposed water system (flush toilets at the Company Store and availability of potable water) and the installation of a vault toilet along the Root Glacier trail would mitigate potential impacts to water quality from increased visitation.

Installation of a hydroelectric system: Such a system would require long-term withdrawal of water out of National or Bonanza Creek, an impact of long-term duration that would result in a measurable change in resource condition.

These reasonably foreseeable actions contribute a moderate negative impact to water resources in the NHL. The cumulative impact of this alternative plus these past, present, and reasonably foreseeable actions would be moderate.

Conclusion: Direct and indirect effects of Alternative 4 on water resources would be moderate because of the long-term nature and medium intensity of some of the impacts. Combined with past, present, and reasonably foreseeable actions, impacts to water resources would be moderate.

4.4 Vegetation

4.4.1 Alternative 1, No Action:

Direct and Indirect Effects: Under the No Action Alternative, stabilization of historic structures would stop. Only cyclic maintenance would occur. Cyclic maintenance of historic structures might require occasional removal of vegetation that is causing damage to structures or that obstructs access for siding replacement, painting, etc. This would amount to less than an acre of vegetation and would be a long-term but low intensity impact.

No vegetation clearing is proposed for fire protection or to enhance scenic views.

No monitoring or control of invasive plant species would occur. Existing infestations of invasive plants would be expected to spread. At moderate to heavy levels of infestation, invasive plant species decrease native plant species cover and diversity and can change ecosystem processes (soil nutrient cycles, natural succession, frequency of wildfire). This could result in long-term and high-intensity impacts to area vegetation.

There would be no improvement of existing trails or circulation routes under this alternative and no vegetation clearing in association with new trail construction would occur.

Under the No Action alternative, there would be no attempt at education or regulation of recreational ORV use. Without education of this user group, recreational ORV use in the area would be expected to increase. Increased recreational ORV use up the Jumbo trail could lead to impacts in the headwaters of Bonanza Creek. Use of ORVs off existing trails can result in disturbance to vegetation, including direct mortality, reduction in plant cover and biomass, soil compaction, and alterations in soil composition (NPS, 2011). ORV trail corridors often become vectors for dispersal of exotic plant species (Loomis and Lieberman, 2006). ORVs can disperse seeds and other reproductive plant parts through dirt and debris stuck in tire treads, wheel wells, or along the undercarriage. ORVs may increase the rate of invasion by exotic plants through seed dispersal and through disruption and disturbance of native plant communities, which allow exotic plants to become more easily established.

Because lack of control of invasive species could lead to long-term and medium intensity impacts, the overall direct and indirect impacts to vegetation are considered moderate.

Cumulative Effects: Past impacts to area vegetation described in section 4.2.1 of this document have had short-term, medium-intensity impacts on area vegetation. These have resulted in minor impacts to vegetation in the area.

The following reasonably foreseeable actions could affect vegetation:

Private subdivision lots in the Kennecott millsite: Private lots may change hands and currently undeveloped lots may be developed. Private development can impact vegetation resources through land clearing and long-term conversion of vegetation types. Although not predicted to occur on a large

number of acres, these impacts would be permanent and of a medium duration (impact results in a measurable change in resource condition).

University of Alaska lands: Sale and development of additional University lands would impact vegetation through land clearing and long-term conversion of vegetation types. These impacts would be permanent and of a medium duration.

McCarthy Road Improvements: Minor improvements and widening is proposed on the State right-of-way between McCarthy and Kennecott. Vegetation clearing associated with road improvements would be a long-term impact of medium intensity.

Park visitation: NPS estimates approximately 12,000 visitors annually to the McCarthy/Kennecott area. Future trends are dependent on area transportation. McCarthy road upgrades will likely result in an upward trend in visitation to the area. Increased visitation without trail improvements would result in increased numbers of social trails in the area, with associated soil compaction and vegetation trampling. Impacts would be temporary and of a low intensity.

These reasonably foreseeable actions contribute a moderate negative impact to vegetation in the NHL. The cumulative impact of this alternative plus these past, present, and reasonably foreseeable actions would be moderate.

Conclusion: Direct and indirect effects of Alternative 1 on vegetation would be moderate because of the long-term nature and medium intensity impacts associated with the lack of invasive species control. Combined with past, present, and reasonably foreseeable actions, impacts to vegetation would be moderate.

4.4.2 Alternative 2, Proposed Action

Direct and Indirect Effects:

Vegetation clearing is proposed around historic structures in order to reduce fire hazard and some limited vegetation clearing is proposed to enhance viewsheds. For fire clearing, all white spruce within 30' of buildings would be removed; spruce would be limbed 10' high within 100' of buildings; and all woody vegetation within 5' of buildings would be removed. Removal of spruce trees and all woody vegetation would decrease plant cover and alter plant composition within those areas. Herbaceous plant cover would be left in place. If not repeated on a regular cycle, these actions will result in alder and willow re-sprouting into cleared areas. Proposed fire protection treatments would amount to 1.22 acres of vegetation impacted.

Selective thinning to improve viewsheds would result in removal of some individual trees and shrubs, a decrease in plant cover, and an alteration of plant composition. Herbaceous plant cover would be left in place. Proposed selective thinning would result in 0.8 acres of vegetation impacted. Vegetation clearing would occur to define the first portion of the aerial tramway (from the tram terminus). Clearing would remove all trees and shrubs for a 20-foot wide swath for approximately 600 feet, resulting in 0.28 acres of vegetation removal. Herbaceous plant cover would be left in place. Because vegetation clearing for fire protection and improved viewshed will be maintained over time, the associated impacts would be considered a long-term impact of low intensity.

Proposed improvements (including housing, cabanas, and communications support) at the recently acquired airport lot would result in permanent removal of 2 – 3 acres of vegetation. This represents a permanent, medium intensity impact on a common park resource.

Invasive plant species management would be consistent with the 2010 Alaska Region Invasive Plant Management Plan. For the Kennecott/McCarthy area this would include monitoring and the use of physical control. If infestations are resistant to physical control, spot treatments of herbicides would be considered based on risk analysis considering factors such as proximity to vegetation harvested by humans; the likelihood of affecting sensitive fish or wildlife habitat; and the likelihood of affecting watershed drinking water. Herbicide use would be subject to mitigation measures identified in Appendix H of this EA. The effects analysis for vegetation described in the 2010 NPS Alaska Region Invasive Plant Management Plan and EA is incorporated into this EA by reference. Where herbicides are used, non-target plants subjected to drift or interspersed with the target invasive plant could experience no effect, reduced vigor, or death depending on the sensitivity of the plant species to the specific herbicide and the dose to which the plant was subjected. Infrequent impacts to individual plants generally have negligible to minor impacts on plant populations, plant communities, or ecological processes. The impacts of pesticide use on vegetation resources would therefore be directly adverse, site-specific, short-term, and negligible to minor.

Improvements to existing circulation routes (such as the old Wagon Road just south of National Creek) would result in vegetation clearing on less than one acre. This alternative proposes a 3.5 mile pedestrian trail to the NHL from the footbridge over the east (dry) fork of Kennicott River. This trail would follow the glacial moraine and require minimal tread construction and vegetation clearing. Impacts to vegetation associated with these activities would be long-term in duration (because the trails would be maintained) but low in intensity.

Under this alternative, a water system would be designed and constructed to provide potable water for visitor use and for NPS facilities in Kennecott milltown. The water system would also provide limited fire suppression (sprinklers) in some historic structures. At this time, NPS is still exploring the potential for the use of groundwater. Once NPS has enough information to consider design alternatives, a project-specific EA will be done considering site-specific effects on water resources.

Development of a walk-in campground with designated tent sites, vault toilets, bear-proof trash receptacles, and a centralized food preparation and eating area would result in vegetation disturbance (trampling or removal) of approximately 0.25 acres. Impacts to vegetation would be long-term in duration but low in intensity.

Installation of a vault toilet north of the NHL along the Root Glacier trail and relocation/reconstruction of the existing Jumbo Creek outhouse would require very little vegetation clearing.

All together, the activities described above would result in vegetation clearing or thinning on about 5.0 acres within the NHL. Associated impacts are generally long-term, low to moderate intensity, and affect a common park resource. Consequently, direct and indirect impacts to vegetation associated with this alternative are considered moderate.

Cumulative Effects: Same as described for Alternative 1, resulting in moderate impacts to vegetation from past and reasonably foreseeable actions.

Conclusion: Direct and indirect effects of Alternative 2 on vegetation would be moderate because they are generally long-term, low to medium intensity, and affect a common park resource. Combined with past, present, and reasonably foreseeable actions, impacts to vegetation would be moderate.

4.4.3 Alternative 3, Management Concepts

Direct and Indirect Effects: Under this alternative, most historic structures would be managed within the "preservation" class of the *Secretary of Interior's Standards for Treatment of Historic Properties.*

Treatments would emphasize interior stabilization and (where necessary) re-roofing, but would not include re-painting or window replacement. Historic structure stabilization might require occasional removal of vegetation that obstructs access or stabilization efforts. This would amount to less than an acre of vegetation and would be a long-term but low intensity impact.

Vegetation clearing is only proposed under this alternative in association with maintaining existing circulation routes. This would consist of periodic clearing of shrubs or small trees that have grown into the trail. This would amount to a fraction of an acre, would be of temporary duration and low intensity.

Under this alternative, no permanent housing would be constructed at the recently acquired airport lot. The lot would be used for seasonal housing (cabanas) and communications. Vegetation removal would be required on approximately 1 acre.

The NHL would continue to be monitored for invasive plants and populations of such would be manually removed, with no use of herbicides. Physical control of existing invasive plant infestations in the area should result in control and containment of invasive plant species. If not, moderate to low densities of invasive species may facilitate establishment of exotic species and at high densities can reduce the cover and density of both exotic and native species. This could result in long-term and medium intensity impacts to area vegetation.

This alternative proposes a 3.5 mile pedestrian trail to the NHL from the footbridge over the east (dry) fork of Kennicott River. This trail would follow the glacial moraine and require minimal tread construction and vegetation clearing. This alternative explores the potential for approximately 4 miles of other pedestrian trails in the area. Design and construction of these trails would need to be considered in another NEPA compliance document, but some of the proposed trails would require brushing, tread construction, and creek crossings. Assuming the need for trail clearance and vegetation removal on all four miles and a 4-foot clearing width, this would result in long-term cutting and removal of 1.97 acres of shrubs and/or trees. Herbaceous ground cover would only be removed for trail tread construction, if necessary. These impacts would result in long-term and low intensity impact to vegetation.

Under this alternative, no improved water system would be designed or constructed.

Because the impacts described above are generally low intensity and effect a common park resource, the overall direct and indirect impacts to vegetation are minor.

Cumulative Effects: Same as described for Alternative 1, resulting in moderate impacts to vegetation from past and reasonably foreseeable actions.

Conclusion: Direct and indirect effects of Alternative 3 on vegetation would be minor because they are generally long-term, low intensity, and affect a common park resource. Combined with past, present, and reasonably foreseeable actions, impacts to vegetation would be moderate.

4.4.4 Alternative 4, Restoration

Direct and Indirect Effects: Under this alternative, historic structures within the Administrative Core zone would be restored or reconstructed to replicate 1938 conditions. Detailed proposals for building stabilization are described on pp. 59 - 64 of this EA. Historic structure stabilization would require occasional removal of vegetation that obstructs access or stabilization efforts. This would amount to less than an acre of vegetation and would be a long-term but low intensity impact.

Extensive vegetation clearing is proposed in the Administrative, Commercial, and Industrial Zones of the NHL, in order to replicate 1938 conditions. Vegetation clearing on this scale would eliminate all shrubs and trees within NPS-owned portions of the Industrial and Administrative core zones. Herbaceous

vegetation would be left to provide ground cover. This would result in a long-term and high intensity impact on 9.55 acres of existing vegetation.

Vegetation clearing is proposed around historic structures in order to reduce fire hazard and some limited vegetation clearing is proposed to enhance viewsheds. For fire clearing, all white spruce within 30' of buildings would be removed; spruce would be limbed 10' high within 100' of buildings; and all woody vegetation within 5' of buildings would be removed. Removal of spruce trees and all woody vegetation would decrease plant cover and alter plant composition within those areas. Herbaceous plant cover would be left in place. If not repeated on a regular cycle, these actions will result in alder and willow re-sprouting into cleared areas. Proposed fire protection treatments falling outside of the 9.55 acres in the Industrial and Administrative core zones described above would amount to 0.25 acres of vegetation impacted.

Selective thinning to improve viewsheds would result in removal of some individual trees and shrubs, a decrease in plant cover, and an alteration of plant composition. Only 0.2 acres of vegetation outside of the cleared acres in the Industrial and Administrative core zones would be affected by selective thinning. Vegetation clearing would occur to define the first portion of the aerial tramway (from the tram terminus). Clearing would remove all trees and shrubs for a 20-foot wide swath for approximately 600 feet, resulting in 0.28 acres of vegetation removal. Herbaceous plant cover would be left in place.

Proposed improvements (including housing, cabanas, and communications support) at the recently acquired airport lot would result in permanent removal of 2 – 3 acres of vegetation. This represents a permanent, medium intensity impact on a common park resource.

Invasive plant species management would be consistent with the 2010 Alaska Region Invasive Plant Management Plan. For the Kennecott/McCarthy area this would include monitoring and the use of physical control. If infestations are resistant to physical control, spot treatments of herbicides would be considered based on risk analysis considering factors such as proximity to vegetation harvested by humans; the likelihood of affecting sensitive fish or wildlife habitat; and the likelihood of affecting watershed drinking water. Herbicide use would be subject to mitigation measures identified in Appendix H of this EA. The effects analysis for vegetation described in the 2010 NPS Alaska Region Invasive Plant Management Plan and EA is incorporated into this EA by reference. Where herbicides are used, non-target plants subjected to drift or interspersed with the target invasive plant could experience no effect, reduced vigor, or death depending on the sensitivity of the plant species to the specific herbicide and the dose to which the plant was subjected. Infrequent impacts to individual plants generally have negligible to minor impacts on plant populations, plant communities, or ecological processes. The impacts of pesticide use on vegetation resources would therefore be directly adverse, site-specific, short-term, and negligible to minor.

Improvements to existing circulation routes and the construction of boardwalks in the Industrial and Administrative core zones proposed under this alternative would occur in areas already cleared (as described above) to replicate 1938 conditions. This alternative proposes a 3.5 mile pedestrian trail to the NHL from the footbridge over the east (dry) fork of Kennicott River. This trail would follow the glacial moraine and require minimal tread construction and vegetation clearing. Impacts to vegetation associated with this trail would be long-term in duration but low in intensity.

Under this alternative, a water system would be designed and constructed to provide potable water for visitor use and for NPS facilities in Kennecott milltown. The water system would also provide limited fire suppression (sprinklers) in some historic structures. At this time, NPS is still exploring the potential for the use of groundwater. Most distribution or collection lines associated with such a system would likely occur within the Industrial or Administrative core areas where vegetation would be removed to replicate 1938 conditions as described above. Once NPS has enough information to consider design

alternatives for a water system, a project-specific EA will be done considering site-specific effects on vegetation.

Development of a walk-in campground with designated tent sites, vault toilets, bear-proof trash receptacles, potable water, and a centralized food preparation and eating area would result in vegetation disturbance (trampling or removal) of approximately 0.25 acres. Impacts to vegetation would be long-term in duration but low in intensity.

Installation of a vault toilet north of the NHL along the Root Glacier trail and relocation/reconstruction of the existing Jumbo Creek outhouse would require very little vegetation clearing.

All together, the activities described above would result in vegetation clearing or thinning on about 13.25 acres within the NHL. The dominant impact is that of the 9.55 acres cleared to replicate 1938 conditions. This would result in a long-term, high intensity impact that affects a common park resource. Consequently, direct and indirect impacts to vegetation associated with this alternative are considered moderate.

Cumulative Effects: Past, present, and reasonably foreseeable actions and impacts are the same as described for Alternative 1 and would result in moderate impacts to area vegetation.

Conclusion: Direct and indirect effects of Alternative 4 on vegetation would be moderate because the large-scale clearing represents a long-term, high intensity impact that affects a common park resource. Combined with past, present, and reasonably foreseeable actions, impacts to vegetation would be moderate.

4.5 Cultural Resources

4.5.1 Methodology

This analysis assumes compliance with the national and site-specific NHL programmatic agreements between NPS and SHPO (See Appendices D and E, respectively). Specifically, the programmatic agreement regarding stabilization, rehabilitation, reconstruction, and maintenance of structures at Kennecott Mines National Historic Landmark states: "Undertakings associated with stabilization, rehabilitation, reconstruction, adaptive reuse, and ongoing maintenance of historic structures listed here will be reviewed for Section 106 purposes within WRST without further review by the SHPO or ACHP provided:

1. That these undertakings are based upon information adequate to identify and evaluate affected cultural resources;
2. That WRST finds that their effects on cultural resources in the NHL will not be adverse based on criteria in 36 CFR, 800.6;
3. That stabilization, rehabilitation, reconstruction and maintenance is compatible with the historic and architectural qualities of Kennecott Mines NHL in terms of scale, massing, color, and materials, and applicable policies, guidelines, and standards as identified in the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings…"*

Under any alternative, compliance with the programmatic agreements insures that proposed actions will not have an adverse effect on cultural resources in the NHL, or the adverse effect will be mitigated through consultation with SHPO. While an individual action may not result in a negative impact to an

historic property, successive actions to one or more may result in an Adverse Effect to the cultural landscape as a whole.

4.5.2 Alternative 1, No Action

Direct and Indirect Effects, Cultural Landscapes:

Under the No Action Alternative, stabilization of historic structures would stop. Only cyclic maintenance would occur. Table 4-1 summarizes the individual building treatments under Alternative 1 for NPS-owned historic structures and the anticipated effects of the treatment/non-treatment:

Table 4-1: Effects of Alternative 1 on historic structures

Historic Structure	Treatment	Effect
Concentration mill and tram terminus	Lower levels 1 – 7 stabilized. No further treatment on upper levels or tram terminus	Deterioration and possible collapse of upper portion of building
Leaching plant (north section)	Foundation replacement, repairs to floor and wall structure.	Stabilized building will remain a significant cultural landscape feature.
Leaching plant (south section)	No interior false-work/rigging	Potential collapse of south section onto the railroad corridor or into the north addition.
Power plant	Stabilization complete	Stabilized building will remain a significant cultural landscape feature
Machine shop	Stabilization complete on main structure. No stabilization of service decks.	Stabilized building will remain a significant cultural landscape feature; service decks will collapse
Store and Warehouse	Stabilization complete; no further work for adaptive re-use of structure.	Stabilized building will remain a significant cultural landscape feature.
Manager's Office	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
National Creek Bunkhouse	No re-roofing or interior reinforcement of building	Deterioration and possible collapse
West Bunkhouse	New foundation and stabilization complete; no interior work.	Stabilized building will remain a significant cultural landscape feature.
Schoolhouse	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
Assay Office	Impacted by 2006 flood; demolished in 2010 by NPS to accommodate the National Creek streambed work	Loss of a cultural landscape feature.
Recreation Hall	Stabilization complete	Stabilized building will remain a significant cultural landscape feature
Depot	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
Refrigerator plant	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
Other historic structures acquired by NPS since 2001		
Hospital	Foundation stabilized; no interior false-work or new roofing	Deterioration and possible collapse
Transformer House	Re-roofing, new foundation; no new windows	Stabilized building will remain a cultural landscape feature
Old Schoolhouse	Stabilization complete	Stabilized building will remain a cultural landscape feature

Dairy Barn	Stabilization complete	Stabilized building will remain a cultural landscape feature
East Bunkhouse	Foundation replacement done; no roof replacement	Deterioration
Silk Stocking Cottages (2)	Stabilization complete	Being adaptively used as housing. Stabilized buildings will remain a cultural landscape feature.
Cottage 39C, Lot 88	Stabilization complete	Stabilized building will remain a cultural landscape feature.
Cottage 13C, Lot 80	No stabilization	Structure will deteriorate and/or collapse
Cottage 39B, Lot 87	Structure collapsed from heavy snowload in 2012.	Ruins will deteriorate.

Archeological Features: This alternative would take no action to proactively preserve archeological resources contributing to the character and interpretation of the NHL. However, it would require the least amount of removal/relocation of archeological features because it proposes the least amount of historic structure stabilization.

Circulation systems: This alternative would not maintain circulation systems such as historic roads or trails. It does not propose re-construction of any boardwalks.

Small scale features: This alternative does not propose the restoration of any small scale features.

Fire risk: No improvement is proposed for a water system under this alternative. Fire suppression capabilities would remain as they are (very limited). No vegetation clearing would be done around historic structures. The potential exists for arson or wildland fire resulting in loss of historic structures.

Overall, this alternative proposes the fewest actions that would stabilize, preserve, and interpret the key patterns, relationships, and remaining structures and features that define the historic, cultural and natural character of the NHL. Conversely, this alternative has less potential to result in removal of archeological features as a result of historic structure stabilization and/or introduction of non-historic elements (such as water tanks or water lines) into the cultural landscape.

Actions Outside of the NHL: For actions outside of the NHL, cultural resource surveys would be conducted prior to any projects being implemented. Evaluation of potential impacts to cultural resources would occur consistent with NEPA and with section 106 of NHPA. This alternative does not propose any actions outside the NHL that could potentially effect cultural resources.

Cumulative Effects: Past stabilization efforts described in section 4.2.1 of this document have had a direct positive impact on the historic structures. Stabilization of historic structures requires removal of adjacent tailings, wood scatters, and archeological features. While inventoried and documented during the removal process, loss of these features constitutes a negative impact on the cultural landscape.

The following reasonably foreseeable actions could affect cultural resources:

Private subdivision lots in the Kennecott millsite: Private lots may change hands and currently undeveloped lots may be developed. Private development can impact cultural resources through placement of non-historical features on the landscape and/or removal of archeological features. Although not predicted to occur on a large number of acres, these impacts would be permanent and of high intensity.

Park visitation: NPS estimates approximately 12,000 visitors annually to the McCarthy/Kennecott area. Future trends are dependent on area transportation. Increased visitation to un-monitored historic sites or structures can result in displacement or looting of historic features. Un-managed social trails can detract from historic circulation patterns.

AKDOT improvements on McCarthy to Kennecott road: Vegetation clearing and/or widening of the road could result in displacement or removal of archeological features such as old railroad steel.

These reasonably foreseeable actions contribute a moderate negative impact to cultural resources in the NHL. The cumulative impact of this alternative plus these past, present, and reasonably foreseeable actions would be moderate.

Conclusion: This alternative has less potential than the others to result in removal of archeological features as a result of historic structure stabilization and/or introduction of non-historic elements (such as water tanks or water lines) into the cultural landscape. The impact to the entire cultural landscape as it exists today would be negligible. Combined with past, present, and reasonably foreseeable actions, impacts to cultural resources would be moderate.

4.5.3 Alternative 2, Preferred

Direct and Indirect Effects, Cultural Landscapes:

Under the Preferred Alternative, historic structures would be managed to reflect a diversity of treatments. Some structures are beyond repair and would be managed as ruins and allowed to deteriorate in place, some would be stabilized and preserved, and some would be rehabilitated to accommodate adaptive re-use. Under this alternative, preservation treatments include painting and/or window replacement to provide weatherization in order to protect the public's investment and ensure that buildings are standing for generations to come. Table 4-1 summarizes the individual building treatments under Alternative 2 for the NPS-owned historic structures within the NHL and the anticipated effects of the treatment/non-treatment:

Table 4-2: Effects of Alternative 2 on historic structures

Historic Structure	Treatment	Effect
Concentration mill and tram terminus	Building stabilized through foundation and column and truss repairs. Reconstruction of upper tram deck and roof.	Stabilized building will remain a significant cultural landscape feature.
Leaching plant (north section)	Foundation replacement, repairs to floor and wall structure.	Stabilized building will remain a significant cultural landscape feature.
Leaching plant (south section)	interior false-work/rigging; no external work	Managed as a ruin; internally stabilized building will slowly deteriorate.
Power plant	Stabilization complete	Stabilized building will remain a significant cultural landscape feature
Machine shop	Stabilization complete on main structure. Stabilization of service decks.	Stabilized building and service decks will remain a significant cultural landscape feature
Store and Warehouse	Stabilization complete; further interior work proposed for adaptive re-use.	Stabilized building will remain a significant cultural landscape feature.
Manager's Office	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
National Creek Bunkhouse	Re-roofing and interior reinforcement of building	Stabilized building will remain a significant cultural landscape feature.

West Bunkhouse	New foundation and stabilization complete; may be considered for adaptive re-use in partnership.	Stabilized building will remain a significant cultural landscape feature.
Schoolhouse	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
Assay Office	Salvaged remains would be returned to their original location and interpreted as a ruin.	Salvaged remains will deteriorate over time.
Recreation Hall	Stabilization complete	Stabilized building will remain a significant cultural landscape feature
Depot	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
Refrigerator plant	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
Other historic structures acquired by NPS since 2001		
Hospital	Foundation stabilized; interior false-work and new roofing	Slow deterioration, stabilized building will remain a cultural landscape feature
Transformer House	Re-roofing, new foundation; new windows	Stabilized building will remain a cultural landscape feature
Old Schoolhouse	Stabilization complete	Stabilized building will remain a cultural landscape feature. Introduction of non-historic features associated with conversion to a visitor contact station could result in an adverse impact to the cultural landscape.
Dairy Barn	Stabilization complete	Stabilized building will remain a cultural landscape feature
East Bunkhouse	Foundation replacement done; roof replacement scheduled	Stabilized building will remain a cultural landscape feature
Silk Stocking Cottages (2)	Stabilization complete	Being adaptively used as housing. Stabilized buildings will remain a cultural landscape feature.
Cottage 39C, Lot 88	Stabilization complete	Stabilized building will remain a cultural landscape feature.
Cottage 13C, Lot 80	No stabilization	Structure will deteriorate and/or collapse
Cottage 39B, Lot 87	Structure collapsed from heavy snowload in 2012.	Ruins will deteriorate.

Archeological Features: Wherever possible, archeological features would be preserved in place as part of the cultural landscape. Historic structure stabilization sometimes requires removal of archeological features while work is taking place. Archeological features documented in the 2001 Cultural Landscape Report will be replaced after stabilization. However, removal and replacement will result in the loss of some noncontributing features and the loss of material that is hard to handle, preserve, and replace, such as wood scatter.

Circulation systems: This alternative maintains circulation systems such as historic roads or trails. Boardwalk reconstruction is proposed in several locations and would highlight historic circulation patterns.

Small scale features: To enhance the interpretive environment, some small scale features would be preserved and/or reconstructed.

Fire risk: A water system is proposed to provide potable water and limited fire suppression to some historic structures. Installation of water lines anywhere within the NHL would disturb archeological

resources and would require pre-construction cultural surveys and monitoring during construction. Construction of a water holding tank would be an Adverse Effect to the landscape, through the introduction of a non-historic element. Fire detection and suppression systems associated with this system could result in early detection and suppression and lower the risk of the loss of historic structures to wildland fire or arson. Proposed vegetation clearing around historic structures further lowers the risk from wildland fire.

Because of the introduction of non-historic elements, some actions proposed in this alternative would result in an adverse effect to the cultural landscape. These would be long term, medium intensity impacts to an important park resource and would result in moderate impacts to cultural resources.

Actions Outside of the NHL: For actions outside of the NHL, cultural resource surveys would be conducted prior to any projects being implemented. Evaluation of potential impacts to cultural resources would occur consistent with NEPA and with section 106 of NHPA. This alternative proposes trail construction, development of a walk-in campground with minimal development, and land clearing and ground disturbance associated with housing and facilities construction at the recently acquired airport lot. Ground disturbance requiring cultural clearance would amount to less than five acres from all these projects combined.

Cumulative Effects: Same as described for cultural resources under Alternative 1.

Conclusion: Because of the introduction of non-historic elements, some actions proposed in this alternative would result in an adverse effect to the cultural landscape. Additionally, some archeological resources would be displaced from the landscape as a result of historic structure stabilization. These would be long term, medium intensity impacts to an important park resource and would result in moderate impacts to cultural resources. Combined with past, present, and reasonably foreseeable actions, impacts to cultural resources would be moderate.

4.5.4 Alternative 3, Management Concepts

Direct and Indirect Effects, Cultural Landscapes:

Under the Management Concepts alternative, historic structure treatments would emphasize interior stabilization and (where necessary) re-roofing, but would not include re-painting or window replacement. Wherever possible, archeological resources would be retained on the landscape. Vegetation clearing would be done only to maintain historical circulation routes. Table 4-1 summarizes the individual building treatments under Alternative 3 for NPS-owned historic structures and the anticipated effects of the treatment/non-treatment:

Table 4-3: Effects of Alternative 3 on historic structures

Historic Structure	Treatment	Effect
Concentration mill and tram terminus	Building stabilized through foundation and column and truss repairs. No reconstruction of upper tram deck and roof.	Stabilized building will remain a significant cultural landscape feature. Building deterioration would occur without reconstructed tram roof.
Leaching plant (north section)	Foundation replacement, repairs to floor and wall structure.	Stabilized building will remain a significant cultural landscape feature.
Leaching plant (south section)	interior false-work/rigging; no external work	Managed as a ruin; internally stabilized building will slowly deteriorate.
Power plant	Stabilization complete	Stabilized building will remain a significant cultural landscape feature
Machine shop	Stabilization complete on main	Stabilized building will remain a significant

	structure. No stabilization of service decks.	cultural landscape feature. Service decks will collapse.
Store and Warehouse	Stabilization complete; lack of water limits adaptive re-use.	Stabilized building will remain a significant cultural landscape feature.
Manager's Office	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
National Creek Bunkhouse	Re-roofing and interior reinforcement of building	Stabilized building will remain a significant cultural landscape feature.
West Bunkhouse	New foundation and stabilization complete; lack of water may limit future adaptive re-use.	Stabilized building will remain a significant cultural landscape feature.
Schoolhouse	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
Assay Office	Salvaged remains would be returned to their original location and interpreted as a ruin.	Salvaged remains will deteriorate over time.
Recreation Hall	Stabilization complete	Stabilized building will remain a significant cultural landscape feature
Depot	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
Refrigerator plant	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
Other historic structures acquired by NPS since 2001		
Hospital	Foundation stabilized; interior false-work and new roofing	Slow deterioration, stabilized building will remain a cultural landscape feature
Transformer House	Re-roofing, new foundation; new windows	Stabilized building will remain a cultural landscape feature
Old Schoolhouse	Stabilization complete	Stabilized building will remain a cultural landscape feature. Introduction of non-historic features associated with conversion to a visitor contact station could result in an adverse impact to the cultural landscape.
Dairy Barn	Stabilization complete	Stabilized building will remain a cultural landscape feature
East Bunkhouse	Foundation replacement done; roof replacement scheduled	Stabilized building will remain a cultural landscape feature
Silk Stocking Cottages (2)	Stabilization complete	Being adaptively used as housing. Stabilized buildings will remain a cultural landscape feature.
Cottage 39C, Lot 88	Stabilization complete	Stabilized building will remain a cultural landscape feature.
Cottage 13C, Lot 80	No stabilization	Structure will deteriorate and/or collapse
Cottage 39B, Lot 87	Structure collapsed from heavy snowload in 2012.	Ruins will deteriorate.

Archeological Features: Wherever possible, archeological features would be preserved in place as part of the cultural landscape. Historic structure stabilization sometimes requires removal of archeological features while work is taking place. Archeological features documented in the 2001 Cultural Landscape Report will be replaced after stabilization. However, removal and replacement will result in the loss of some noncontributing features and the loss of material that is hard to handle, preserve, and replace, such as wood scatter.

Circulation systems: This alternative does not maintain circulation systems such as historic roads or trails. No boardwalk reconstruction is proposed.

Small scale features: No reconstruction of small scale features is proposed.

Fire risk: No water system or vegetation clearing around historic structures is proposed under this alternative. The potential exists for loss of historic structures through arson or wildfire. However, there would be no disturbance of buried archeological resources associated with construction of water lines and no introduction of non-historical elements (water tank).

Because it results in the introduction of a non-historic element, the addition of a covered back porch on the Blackburn school would result in an adverse effect to the cultural landscape. Additionally, some archeological resources would be displaced from the landscape as a result of historic structure stabilization. These would be long term, low intensity impacts to an important park resource and would result in minor impacts to cultural resources.

Actions Outside of the NHL: For actions outside of the NHL, cultural resource surveys would be conducted prior to any projects being implemented. Evaluation of potential impacts to cultural resources would occur consistent with NEPA and with section 106 of NHPA. This alternative proposes trail construction (7.5 total miles, 1.97 acres ground disturbance; a walk-in campground with minimal development (less than 1 acre ground disturbance), and land clearing and ground disturbance associated with cabanas and facilities construction at the recently acquired airport lot (approximately 1 acre ground disturbance). Ground disturbance requiring cultural clearance would amount to approximately 4 acres from all these projects combined.

Cumulative Effects: Same as described for cultural resources under Alternative 1.

Conclusion: Actions associated with this alternative would result in long term, low intensity impacts to an important park resource and would result in minor impacts to cultural resources.

Combined with past, present, and reasonably foreseeable actions, impacts to cultural resources would be moderate.

4.5.5 Alternative 4, Restoration

Direct and Indirect Effects, Cultural Landscapes:

Under the Management Concepts alternative, historic structures within the Administrative Core zone would be restored or reconstructed to replicate 1938 conditions. In other zones, all structures would be stabilized and preserved and some would be rehabilitated to accommodate adaptive re-use. Preservation treatments would include painting and/or window replacement to provide weatherization in order to protect the public's investment and ensure that buildings are standing for generations to come. Table 4-1 summarizes the individual building treatments under Alternative 4 for NPS-owned historic structures and the anticipated effects of the treatment/non-treatment:

Table 4-4: Effects of Alternative 4 on historic structures

Historic Structure	Treatment	Effect
Concentration mill and tram terminus	Building stabilized through foundation and column and truss repairs. Reconstruction of upper tram deck and roof.	Stabilized building will remain a significant cultural landscape feature.
Leaching plant (north	Foundation replacement, repairs to	Stabilized building will remain a significant

section)	floor and wall structure.	cultural landscape feature.
Leaching plant (south section)	interior false-work/rigging; no external work	Managed as a ruin; internally stabilized building will slowly deteriorate.
Power plant	Stabilization complete	Stabilized building will remain a significant cultural landscape feature
Machine shop	Stabilization complete on main structure. Stabilization of service decks.	Stabilized building and service decks will remain a significant cultural landscape feature.
Store and Warehouse	Stabilization complete; adaptive re-use for exhibits and/or offices	Stabilized building will remain a significant cultural landscape feature.
Manager's Office	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
Staff house, Superintendent's house, and Stephen Birch house	These structures are gone. Reconstruct.	Reconstructed buildings will remain a significant cultural landscape feature.
National Creek Bunkhouse	Re-roofing and interior reinforcement of building	Stabilized building will remain a significant cultural landscape feature.
West Bunkhouse	New foundation and stabilization complete; consider adaptive re-use in partnership.	Stabilized building will remain a significant cultural landscape feature.
Schoolhouse	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
Assay Office	Reconstruction.	Reconstructed building will remain a significant landscape feature.
Sawmill and Carpenter's Shop	Reconstruct.	Reconstructed building will remain a significant landscape feature.
Recreation Hall	Stabilization complete	Stabilized building will remain a significant cultural landscape feature
Depot	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
Refrigerator plant	Stabilization complete	Stabilized building will remain a significant cultural landscape feature.
Other historic structures acquired by NPS since 2001		
Hospital	Foundation stabilized; interior false-work and new roofing	Slow deterioration, stabilized building will remain a cultural landscape feature
Transformer House	Re-roofing, new foundation; new windows	Stabilized building will remain a cultural landscape feature
Old Schoolhouse	Stabilization complete	Stabilized building will remain a cultural landscape feature. . Introduction of non-historic features associated with conversion to a visitor contact station could result in an adverse impact to the cultural landscape.
Dairy Barn	Stabilization complete	Stabilized building will remain a cultural landscape feature
East Bunkhouse	Foundation replacement done; roof replacement scheduled	Stabilized building will remain a cultural landscape feature
Silk Stocking Cottages (2)	Stabilization complete	Being adaptively used as housing. Stabilized buildings will remain a cultural landscape feature.
Cottage 39C, Lot 88	Stabilization complete	Stabilized building will remain a cultural landscape feature.
Cottage 13C, Lot 80	No stabilization	Structure will deteriorate and/or collapse
Cottage 39B, Lot 87	Structure collapsed from heavy snowload in 2012.	Ruins would deteriorate.

Archeological Features: Wherever possible, archeological features would be preserved in place as part of the cultural landscape. Historic structure stabilization sometimes requires removal of archeological features while work is taking place. Archeological features documented in the 2001 Cultural Landscape Report will be replaced after stabilization. However, removal and replacement will result in the loss of some noncontributing features and the loss of material that is hard to handle, preserve, and replace, such as wood scatter. Additionally, some of the proposed reconstructions would entail the complete destruction of some ruins and the context of the archeological resources they contain. Other proposed reconstructions (such as the Staff House) would require significant excavation of the archeological resources that are present where the buildings once stood.

Circulation systems: This alternative maintains circulation systems such as historic roads or trails. Extensive boardwalk reconstruction is proposed in the Administrative and Industrial Core zones to replicate 1938 conditions and highlight circulation patterns. This alternative proposes reconstruction of features such as utilidors that highlight historic circulation patterns.

Small scale features: Extensive reconstruction of small scale features is proposed.

Fire risk: A water system is proposed to provide potable water and limited fire suppression to some historic structures. Installation of water lines anywhere within the NHL would disturb archeological resources and would require pre-construction cultural surveys and monitoring during construction. Construction of a water holding tank would be an Adverse Effect to the landscape, through the introduction of a non-historic element. Fire detection and suppression systems associated with this system could result in early detection and suppression and lower the risk of the loss of historic structures to wildland fire or arson. Proposed vegetation clearing around historic structures further lowers the risk from wildland fire.

Because of the introduction of non-historic elements, some actions proposed in this alternative would result in an adverse effect to the cultural landscape. Additionally, archeological resources would be displaced from the landscape as a result of water line installations and historic structure stabilization and restoration. These would be long term, medium intensity impacts to an important park resource and would result in moderate impacts to cultural resources.

Actions Outside of the NHL: For actions outside of the NHL, cultural resource surveys would be conducted prior to any projects being implemented. Evaluation of potential impacts to cultural resources would occur consistent with NEPA and with section 106 of NHPA. This alternative proposes trail construction, a walk-in campground with minimal development, and land clearing and ground disturbance associated with housing and facilities construction at the recently acquired airport lot. Ground disturbance requiring cultural clearance would amount to less than five acres from all these projects combined.

Cumulative Effects: Same as described for cultural resources under Alternative 1.

Conclusion: Because of the introduction of non-historic elements, some actions proposed in this alternative would result in an adverse effect to the cultural landscape. Additionally, archeological resources would be displaced from the landscape as a result of water line installations and historic structure stabilization and restoration. These would be long term, medium intensity impacts to an important park resource and would result in moderate impacts to cultural resources.

Combined with past, present, and reasonably foreseeable actions, impacts to cultural resources would be moderate.

4.6 Wildlife

4.6.1 Alternative 1, No Action

Direct and Indirect Effects: Under the no action alternative, no new actions are planned that would negatively impact wildlife and wildlife habitat.

No invasive plant species control or monitoring would occur. Existing infestations of invasive plants would be expected to spread. At moderate to heavy levels of infestation, invasive plant species decrease native plant species cover and diversity and can change ecosystem processes (soil nutrient cycles, natural succession, frequency of wildfire). This could result in long-term and high-intensity impacts to area wildlife habitat and could ultimately cause local displacement of certain small mammal or bird species.

Cumulative Effects: Past actions described in section 4.2.1 of this document include vegetation removal and thinning associated with historic structure stabilization, development of visitor improvements, and wildland fire prevention. These have resulted in minor impacts to vegetation and wildlife habitat.

The following reasonably foreseeable actions could affect wildlife:

Continued occurrence of habituated and food-conditioned bears in the area associated with private residences and businesses: Garbage is a major attractant for bears in the Kennicott valley. Residents were 18 times more likely to be involved in conflicts with bears due to improper storage of garbage than were visitors (Wilder, 2003). The 2003 study suggested that the Kennicott valley may serve as a population sink for surrounding bear populations. A sink is a subpopulation in which deaths exceed births and immigration exceeds emigration. This assertion was based on the unusual sex ratios observed in the study, the high rates of human-caused bear mortality in the valley, the quality of its natural food resources, the widespread availability of human attractants, and basic bear ecology (Wilder, 2003). These conditions lead to a higher potential for human-bear conflicts and bear mortality. This is a long-term impact of medium intensity on an important park resource.

Private subdivision lots in the Kennecott millsite or on University of Alaska lands in the area: Private lots may change hands and currently undeveloped lots may be developed. Private development can impact wildlife in several ways: 1) Alteration of habitat; 2) long-term disturbance and displacement; 3) improper food and/or garbage storage creating bear conflicts; and 4) increase in hunting pressure. These would generally be long-term impacts of a low intensity.

Park visitation: NPS estimates approximately 12,000 visitors annually to the McCarthy/Kennecott area. Future trends are dependent on area transportation. Increased visitation can impact wildlife through increased contact/displacement, habitat impacts associated with social trails, and increased potential for bear encounters. These impacts would be temporary in nature and of a low intensity.

Together, these reasonably foreseeable actions would result in a moderate impact to wildlife and wildlife habitat.

Conclusion: Direct and indirect effects of Alternative 1 on wildlife would be moderate because of potential habitat changes and loss of diversity due to uncontrolled invasive species. Combined with past, present, and reasonably foreseeable actions, impacts to wildlife would be moderate.

4.6.2 Alternative 2, Preferred

Direct and Indirect Effects:

Vegetation clearing is proposed around historic structures in order to reduce fire hazard and some limited vegetation clearing is proposed to enhance viewsheds. Removal of spruce trees and all woody vegetation would decrease plant cover and alter plant composition within those areas. Herbaceous plant cover would

be left in place. If not repeated on a regular cycle, these actions will result in alder and willow re-sprouting into cleared areas. Proposed fire protection treatments would amount to 1.22 acres of vegetation impacted and proposed selective thinning (including vegetation clearing along the lower portion of the aerial tramway) would result in 1.1 acres impacted. These treatments could affect habitat for small mammals and birds. Delaying treatment until July 15 (consistent with guidelines under the Migratory Bird Treaty Act) would avoid any impacts to nesting birds. However, removal of vegetation could displace some individuals. Because of the availability of other similar habitats in the area, these impacts would be long-term in duration but low in intensity.

Proposed improvements (including housing, cabanas, and communications support) at the recently acquired airport lot would result in permanent removal of 2 – 3 acres of wildlife habitat. Delaying vegetation clearing until July 15 would avoid any impacts to nesting birds, but removal of vegetation could displace some individuals. Because of the availability of other similar habitats in the area, these impacts would be permanent in duration but low in intensity.

Invasive plant species management would be consistent with the 2010 Alaska Region Invasive Plant Management Plan. For the Kennecott/McCarthy area this would include monitoring and the use of physical control. If infestations are resistant to physical control, spot treatments of herbicides would be considered based on risk analysis considering factors such as proximity to vegetation harvested by humans; the likelihood of affecting sensitive fish or wildlife habitat; and the likelihood of affecting watershed drinking water. Herbicide use would be subject to mitigation measures identified in Appendix H of this EA. The effects analysis for wildlife described in the 2010 NPS Alaska Region Invasive Plant Management Plan and EA is incorporated into this EA by reference:

"The benefits of Alternative 2 to wildlife and habitat in Alaskan NPS units would be minor and localized in the near term but would prevent moderate to major and more widespread impacts in the longer term. The direct adverse impacts of Alternative 2 to wildlife and habitat in Alaskan NPS units would be no more than minor. The indirect effect of Alternative 2 should be beneficial to wildlife and habitat by more effectively curtailing the long term establishment of invasive plant species. The success of invasive plant management and beneficial effects to native plant communities under Alternative 2 would vary from park to park. In parks where early detection and immediate control are feasible and achievable, the manual and thermal methods available under Alternative 2 would be sufficient to prevent establishment and spread. Because spot treatment with herbicides is included under this Alternative, impacts to wildlife and habitats could be readily reduced or eliminated for most sites even when control is not feasible by manual and thermal methods. Managing invasive plants under Alternative 2 would help parks better achieve the desired condition of maintaining all wildlife habitats as part of the natural park ecosystems. This alternative would result in a minor beneficial effect to wildlife and habitat over the next decade because Alternative 2 methods would contain the majority of current or future invasive plant infestations" (NPS, 2008).

This alternative proposes a 3.5 mile pedestrian trail to the NHL from the footbridge over the east (dry) fork of Kennicott River. This trail would follow the glacial moraine and require minimal tread construction and vegetation clearing. Impacts to wildlife associated with these activities would be long-term in duration (because the trails would be maintained) but low in intensity. Development of a walk-in campground with designated tent sites, vault toilets, bear-proof trash receptacles, and a centralized food preparation and eating area would result in vegetation disturbance (trampling or removal) of approximately 0.25 acres (NPS, 2002). Impacts to vegetation would be long-term in duration but low in intensity. Of greater importance, from a wildlife impacts standpoint, is the potential for increased negative bear-human encounters with the development of these facilities. A 2003 thesis on quantifying bear populations and bear-human conflicts in the Kennicott valley concluded the following:

"The Kennicott valley will continue to be developed as the centerpiece of visitation within WRST for years to come. Human occupation and development of private lands within the valley will also continue apace. The fact that local residents are involved in a disproportionate share of the reported bear-human conflicts suggests that increasing development and human occupation of the valley may presage a dramatic increase in the occurrence of bear-human conflicts in the future. Unless WRST makes bear management a high-priority natural resource concern and devotes adequate personnel and resources to implement pro-active management strategies, bear populations in the park will continue to suffer and human safety will be compromised" (Wilder, 2003).

The study also points to the fact that glacier-edge, soapberry-dominated habitat is high-density bear habitat for the area: "Bears were sampled throughout the study area; distribution of captures was non-uniform with the greatest success occurring along the glacier edge in soapberry habitat that was relatively secure from human disturbance. The two areas of 'high observed bear density' are natural travel corridors with major game trails paralleling the glacier edge. Both areas contain good berry habitat and are relatively secure from human disturbance" (Wilder, 2003). NPS has implemented a program of bear education for visitors and residents alike, as well as enforcement of the use of bearproof food containers for visitors in the backcountry. These strategies have been effective in reducing bear-human conflicts. A walk-in campground would include bear-proof food containers, and a secured food-preparation area separate from campsites. Additionally, development and management of a campground with facilities designed to minimize potential for bear encounters would be an improvement over the existing condition, where visitors are camping at dispersed sites on their own with no facilities provided. However, the 2003 data suggest that there is a high density of bears in the Kennicott valley, that there is a high incidence of food-conditioned bears, and that the proposed campground and glacier trail would occur in high-density bear habitat. While impacts to wildlife from habitat loss would be minimal from these activities, the potential to increase bear-human conflicts exists.

Under this alternative, a water system would be designed and constructed to provide potable water for visitor use and for NPS facilities in Kennecott milltown. The water system would also provide limited fire suppression (sprinklers) in some historic structures. At this time, NPS is still exploring the potential for the use of groundwater. Once NPS has enough information to consider design alternatives, a project-specific EA will be done considering site-specific effects on water resources.

Installation of a vault toilet north of the NHL along the Root Glacier trail and relocation/reconstruction of the existing Jumbo Creek outhouse would require very little vegetation clearing and habitat loss.

All together, the activities described above would result in vegetation clearing or thinning on about 4.75 acres within the NHL and dispersal of recreational activities (hiking and camping) around the area. Loss of habitat associated with the vegetation clearing would result in a long-term but low intensity impact to a common park resource. Increased or dispersed recreational activities in the area would likely result in increased bear-human conflicts, and most likely increased mortality for area bears. This would be considered a temporary impact of medium intensity, occurring to an important park resource. These actions would result in a moderate impact to wildlife.

Cumulative Effects: Past, present, and reasonably foreseeable actions and impacts are the same as described for Alternative 1 and would result in moderate impacts to area wildlife.

Conclusion: Direct and indirect effects of Alternative 2 on wildlife would be moderate. Combined with past, present, and reasonably foreseeable actions, impacts to wildlife would be moderate.

4.6.3 Alternative 3, Management Concepts

Direct and Indirect Effects:

No vegetation clearing is proposed in order to reduce fire hazard or to enhance viewsheds.

Proposed improvements (including cabanas, and communications support) at the recently acquired airport lot would result in permanent removal of approximately 1 acre of wildlife habitat. Delaying vegetation clearing until July 15 would avoid any impacts to nesting birds, but removal of vegetation could displace some individuals. Because of the availability of other similar habitats in the area, these impacts would be permanent in duration but low in intensity.

The NHL would continue to be monitored for invasive plants and populations of such would be manually removed, with no use of herbicides. Physical control of existing invasive plant infestations in the area should result in control and containment of invasive plant species. If not, moderate to low densities of invasive species may facilitate establishment of exotic species and at high densities can reduce the cover and density of both exotic and native species. This could result in long-term and medium intensity impacts to area wildlife habitat.

This alternative proposes a 3.5 mile pedestrian trail to the NHL from the footbridge over the east (dry) fork of Kennicott River and development of a walk-in campground. Effects of these proposed developments are the same as discussed under Alternative 2. Additionally, this alternative proposes construction of 4 miles of additional pedestrian trails in the area. Impacts to wildlife habitat (an estimated 1.97 acres of vegetation removal) would be long-term and low intensity. However, these trails would increase the potential for bear-human conflicts in the area.

Installation of a vault toilet north of the NHL along the Root Glacier trail and relocation/reconstruction of the existing Jumbo Creek outhouse would require very little vegetation clearing and habitat loss.

All together, the activities described above would result in vegetation clearing or thinning on less than 5 acres within the NHL and dispersal of recreational activities (hiking and camping) around the area. Loss of habitat associated with the vegetation clearing would result in a long-term but low intensity impact to a common park resource. Increased or dispersed recreational activities in the area would likely result in increased bear-human conflicts, and most likely increased mortality for area bears. This would be considered a temporary impact of medium intensity, occurring to an important park resource. These actions would result in a moderate impact to wildlife.

Cumulative Effects: Past, present, and reasonably foreseeable actions and impacts are the same as described for Alternative 1 and would result in moderate impacts to area wildlife.

Conclusion: Direct and indirect effects of Alternative 3 on wildlife would be moderate. Combined with past, present, and reasonably foreseeable actions, impacts to wildlife would be moderate.

4.6.4 Alternative 4, Restoration

Direct and Indirect Effects:

Extensive vegetation clearing is proposed in the Administrative, Commercial, and Industrial Zones of the NHL, in order to replicate 1938 conditions. Vegetation clearing on this scale would eliminate all shrubs and trees within NPS-owned portions of the Industrial and Administrative core zones. Herbaceous vegetation would be left to provide ground cover. This would result in a loss of 9.55 acres of habitat for some bird and small mammal species, and loss of hiding cover for some larger species. This would be a long-term and low intensity impact on wildlife.

All other direct and indirect effects to wildlife (from vegetation clearing around historic structures, thinning for viewshed improvement (including the lower portion of the aerial tramway), trail construction, walk-in campground, and airport lot development) would be the same as described under Alternative 2.

All together, the activities described above would result in vegetation clearing or thinning on about 15 acres within the NHL and dispersal of recreational activities (hiking and camping) around the area. Loss of habitat associated with the vegetation clearing would result in a long-term and medium intensity impact to a common park resource. Increased or dispersed recreational activities in the area would likely result in increased bear-human conflicts, and most likely increased mortality for area bears. This would be considered a temporary impact of medium intensity, occurring to an important park resource. These actions would result in a moderate impact to wildlife.

Cumulative Effects: Past, present, and reasonably foreseeable actions and impacts are the same as described for Alternative 1 and would result in moderate impacts to area wildlife.

Conclusion: Direct and indirect effects of Alternative 4 on wildlife would be moderate. Combined with past, present, and reasonably foreseeable actions, impacts to wildlife would be moderate.

4.7 Visual Resources

4.7.1 Alternative 1, No Action

Direct and Indirect Effects:

Outside the mill-town: This alternative does not propose any actions that would impact visual resources outside of the mill-town.

Within the mill-town: Within the mill town, visual resources relate primarily to the historic character of the mill town. No vegetation thinning would occur for improvement of historic views. Without these actions, historic views will continue to be obscured by vegetation. Under this alternative, stabilization of historic structures would stop and cyclic maintenance would occur. The "end result" visually would be a mix of external treatments: some historic structures freshly painted, some stabilized and unpainted, and some un-stabilized and deteriorating or collapsing. This alternative would be least effective in maintaining the historic character of the mill town, but most effective at managing the site for an "abandoned" or "ghost-town" feel. Because stabilization work would stop, this alternative would minimize the visual impacts of on-going work (cranes, heavy equipment, orange work vests, large material storage areas).

Cumulative Effects: Actions described in section 4.2.1 of this document that have impacted visual resources include construction, landscaping, painting, and "clean up" associated with historic structure stabilization, vegetation clearing and thinning, National Creek stream channelization, visitor improvements (such as the shuttle turnaround), and infrastructure associated with NPS activities (such as the Dairy Barn storage yard). These activities have resulted in long-term, medium-intensity impacts on an important park resource.

The following reasonably foreseeable actions could affect visual resources:

Private subdivision lots in the Kennecott millsite: Private lots may change hands and currently undeveloped lots may be developed. Private development can impact visual resources in several ways: 1) vegetation clearing to accommodate home construction or for fire protection; 2) construction of visually obtrusive structures; 3) introduction of linear features such as roads, trails, or pipelines that may or may not be visible. Covenants imposed on lot owners are designed to keep new structures compatible

with the historic landscape. These impacts are long-term and medium intensity on an important park resource.

Road improvements to the state right-of-way between McCarthy and Kennecott: Improvements would be accompanied by vegetation clearing and potential road widening. This has the visual effect of creating a more dominant linear feature on the landscape.

Taken together, the combination of past, present, and reasonably foreseeable actions has resulted in a moderate impact to visual resources.

Conclusion: The No Action alternative proposes fewer actions than any other alternative that could adversely impact visual resources. Cumulatively, it would result in a moderate impact to visual resources.

4.7.2 Alternative 2, Preferred

Direct and Indirect Effects

Outside the mill-town: Outside of the mill-town, the following actions could have an impact on visual resources:

Construction of a 3.5 mile pedestrian trail paralleling the Kennicott glacier would require very little vegetation clearing and tread construction. This trail will not be visible to people driving the McCarthy/Kennecott road and only small linear portions might be visible from the air.

Development of a walk-in campground would involve minimal vegetation removal. However, establishment of a central cooking/food storage area, outhouses, and dispersed campsites would be visible from the air. These facilities would not be visible to visitors driving the McCarthy/Kennecott road.

Development of the 5-acre airport lot to support housing and/or communication and storage facilities would require vegetation removal, gravel pads, and construction of structures. Because of the location, these developments would not be visible to most visitors arriving at Kennecott via ground transportation. It would be visible to those arriving by air or utilizing the airport.

These impacts amount to long-term, low intensity impacts on an important park resource.

Within the mill-town: Within the mill town, visual resources relate primarily to the historic character of the mill town. Vegetation thinning would occur for improvement of historic views and for fire protection around each historic structure. Vegetation clearing around each structure would improve the visibility of some structures to visitors but could detract from an "abandoned" feel. Vegetation clearing along the lower portion of the aerial tramway would create a visible linear feature, but it highlights an important element of the cultural landscape. Some re-vegetation would occur to restore historic non-invasive vegetation and native plants might be used to screen selective views.

Development of a water system would likely require a water storage tank and pipelines. Pipelines would likely utilize existing disturbances (roads, trails, or utilidors) but a storage tank on the hillside above town would introduce a new feature and would be a long-term, high intensity impact. Under this alternative, stabilization of historic structures would occur. The "end result" visually would be a mix of external treatments: most stabilized historic structures freshly painted, some stabilized and unpainted, and some un-stabilized and deteriorating or collapsing. Freshly painted buildings represent a visual change and can stand out among older, unpainted buildings. Painting is a temporary, medium intensity impact that is done to protect an important park resource. Visual impacts associated with on-going work (cranes, heavy equipment, orange work vests, large material storage areas) would continue for at least the next five years.

Cumulative Effects: Same as described for Alternative 1.

Conclusion: The preferred alternative proposes actions outside of the mill town that, because of their low intensity, would result in a minor impact to visual resources. Within the milltown, the direct and indirect effects resulting from water system development, vegetation clearing, historic structure stabilization, and painting of historic structures would result in a moderate impact to visual resources.

Combined with past, present, and reasonably foreseeable actions, the impacts to visual resources are moderate.

4.7.3 Alternative 3, Management Concepts

Outside the mill-town: Outside of the mill-town, the following actions could have an impact on visual resources:

Construction of a 3.5 mile pedestrian trail paralleling the Kennicott glacier would require very little vegetation clearing and tread construction. This trail will not be visible to people driving the McCarthy/Kennecott road and only small linear portions might be visible from the air. Construction of 4 additional miles of pedestrian trails in the area would require 1.97 acres of vegetation removal and some tread construction. These trails would not be visible to the average visitor arriving at McCarthy/Kennecott via ground transportation. From the air, portions of these trails might appear as linear features.

Development of a walk-in campground would involve minimal vegetation removal. However, establishment of a central cooking/food storage area, outhouses, and dispersed campsites would be visible from the air. These facilities would not be visible to visitors driving the McCarthy/Kennecott road.

Development of the 5-acre airport lot to support housing and/or communication and storage facilities would require vegetation removal, gravel pads, and construction of structures. Because of the location, these developments would not be visible to most visitors arriving at Kennecott via ground transportation. It would be visible to those arriving by air or utilizing the airport.

These impacts amount to long-term, low intensity impacts on an important park resource.

Within the mill-town: Within the mill town, visual resources relate primarily to the historic character of the mill town. No vegetation thinning would occur for improvement of historic views and for fire protection around each historic structure. Continued vegetation encroachment around historic structures and blocking historic views detracts from the cultural-historic setting but contributes to an "abandoned" feel. Under this alternative, stabilization of historic structures would occur. The "end result" visually would be a mix of external treatments: some stabilized historic structures freshly painted, some stabilized and unpainted, and some un-stabilized and deteriorating or collapsing. Visual impacts associated with on-going work (cranes, heavy equipment, orange work vests, large material storage areas) would continue for at least the next five years. Visual impacts occurring under this alternative within the mill-town would be considered temporary and of medium intensity on an important park resource.

Cumulative Effects: Same as described for Alternative 1.

Conclusion: This alternative proposes actions outside of the mill town that, because of their low intensity, would result in a minor impact to visual resources. Within the milltown, the direct and indirect effects resulting from loss of historic views and some painting of historic structures would result in a minor impact to visual resources.

Combined with past, present, and reasonably foreseeable actions, the impacts to visual resources are moderate.

4.7.3 Alternative 4, Restoration

Direct and Indirect Effects:

Outside the mill-town: For proposed actions outside of the mill-town, effects to visual resources would be the same as described under Alternative 2.

Within the mill-town: Within the mill town, visual resources relate primarily to the historic character of the mill town. This alternative attempts to restore the Industrial and Administrative zones to a 1938 condition. Extensive vegetation clearing to replicate 1938 conditions would highlight stabilized and restored historic structures and enhance historic setting but would result in a long-term, high intensity impact on visual resources. Development of a water system would likely require a water storage tank and pipelines. Pipelines would likely utilize existing disturbances (roads, trails, or utilidors) but a storage tank on the hillside above town would introduce a new feature and would be a long-term, high intensity impact. Under this alternative, stabilization and restoration of historic structures would occur. The "end result" visually would be a mix of external treatments, but dominated by stabilized, restored, and freshly painted structures and boardwalks. Freshly painted buildings represent a visual change and can stand out among older, unpainted buildings. Painting is a temporary, medium intensity impact that is done to protect an important park resource. Visual impacts associated with on-going work (cranes, heavy equipment, orange work vests, large material storage areas) would continue for at least the next ten years.

Cumulative Effects: Same as described for Alternative 1.

Conclusion: This alternative proposes actions outside of the mill town that, because of their low intensity, would result in a minor impact to visual resources. Within the milltown, the direct and indirect effects resulting from water system development, large-scale vegetation clearing, historic structure stabilization and restoration, and painting of historic structures would result in a major impact to visual resources.

Combined with past, present, and reasonably foreseeable actions, the impacts to visual resources are major.

4.8 Visitor Use and Experience

4.8.1 Introduction: This analysis assumes the adoption of the 2011 Interpretive Concept Plan for the Kennecott Mines NHL for all alternatives. This document, which was developed after a 3-day workshop during the summer of 2011, describes a strategy for improving visitor experience through the following:

- Providing for visiting options
- Providing a sense of arrival
- Providing a central exhibit in the Company store
- Describing a strategy for exterior interpretation
- Describing a strategy for interior interpretation
- Providing for guided tours
- Providing local pedestrian trail opportunities

This analysis rates the alternatives relative to their ability to carry out the action items identified in the 2011 Interpretive Concept Plan and thus improve visitor experience to the NHL.

4.8.2 Alternative 1, No Action

Direct and Indirect Effects: Under this alternative, no new water system would be installed. Without additional potable water, a sprinkler system, and additional improvements to the Company store, the Blackburn school could not be vacated as office space and converted into a visitor orientation station. No improvements would be made over the current situation to improve the visitors sense of arrival and orientation. Without a new water system, flush toilets would not be installed in the Company Store and visitors would continue to rely on the vault toilets currently provided. Without an enhanced water system, opportunities for adaptive re-use and partnership with the West Bunkhouse would be very limited.

Without additional improvements to the Company Store, there would be no opportunity to develop a central exhibit in the building. There would be no improvement to the visitor experience over the existing situation.

Without full stabilization of the concentration mill/tram terminus, the exterior and interior of the building would deteriorate over time. An unstabilized mill building would eventually pose an unacceptable risk for interior access, and mill tours would need to be stopped. This would minimize interpretive opportunities for the iconic structure in the NHL, detract from the visitor experience, and would be a loss of a guided tour opportunity. Under this alternative, stabilization efforts would cease and five of the historic structures identified in Table 4-2 would deteriorate and/or collapse. This represents a loss of opportunity for visitors to access or see the historic structures that are significant components of the cultural landscape of the site.

Historic circulation routes would not be maintained or enhanced. Continued vegetation encroachment would make these hard to identify for the average visitor, thus decreasing potential opportunities for visitors. No pedestrian trail would be developed on the east side of the Kennecott glacier and no walk-in campground would be developed. These are developments that could provide day-hiking opportunities and alternatives to the dispersed camping situation that currently exists.

With no effort at educating the visiting public regarding motorized access to the NHL, visitors arriving via off-road vehicles and/or motorcycles would increase. Increased motorized use on the state right-of-way between McCarthy and Kennecott, on area trails, and on millsite subdivision easements would result in user conflicts, safety issues, trespass, and would detract from the average visitor's experience. Continued non-management of parking in the NHL would result in haphazard parking throughout the site and would detract from the visitor experience.

Without an additional vault toilet at the start of the Root Glacier trail and re-location of the existing Jumbo creek outhouse, disposal of human waste on day hikes and at dispersed camping sites would continue to be a problem. This would detract from the visitor experience.

Lack of action under this alternative would result in long-term, medium intensity negative impacts, resulting in overall moderate impacts to visitor use and experience.

Cumulative Impacts:

The following reasonably foreseeable actions could affect visitor experience:

Private development in the Kennecott area: Private lots may change hands and currently undeveloped lots may be developed. Private development can impact visitor experience in several ways: 1) haphazard development not consistent with the cultural landscape of the NHL can detract from visitor experience; 2) the NHL is a mix of private and publicly owned lands, and "Kennecott Communities" has been identified as an interpretive theme for the NHL (NPS, 2011). The presence of private lots and development provide an opportunity for visitors to discuss and learn about what it takes to subsist and get

by in a harsh and remote Alaskan environment. Private development can also provide essential services to visitors.

Road improvements to the McCarthy road and the state right-of-way between McCarthy and Kennecott: Improvements have the potential to increase visitation. If not done consistent with past collaborative road corridor planning efforts, improvements to these roads have the potential to detract from visitors experience through visual impacts and/or loss of the feeling of traveling on a rustic historic railroad corridor.

Services provided by McCarthy/Kennecott businesses: Local businesses provide lodging, camping, parking, visitor orientation and education, food, transport to the NHL and to the backcountry, and guiding services. A good proportion of the visitor experience in accessing and experiencing the NHL and surrounding area is provided by private business.

These reasonably foreseeable actions are listed, not to try and quantify impacts to visitor experience, but rather to acknowledge the significance of the proportion of visitor experience that is provided through private business. This reinforces the need for NPS to continue to communicate and coordinate with the local community and local businesses in efforts to enhance visitor experience.

Conclusion: Lack of action under this alternative would result in long-term, medium intensity negative impacts, resulting in overall moderate impacts to visitor use and experience. This alternative does the least to accomplish the action items identified in the 2011 Interpretive Concept Plan.

4.8.3 Alternative 2, Preferred

Direct and Indirect Effects: Under this alternative, a water system would be installed providing potable water and limited fire suppression (sprinkler systems in occupied buildings). Proposed improvements to the Company store would facilitate the movement of office space from the Blackburn school and conversion to the Blackburn school to a visitor orientation site. The Company store would house a central exhibit, and proposed flush toilets would be available to the public. At the Blackburn school, the back porch would be extended to the south to provide a tie-in with the shuttle turnaround. This would provide a link between the existing shuttle turnaround and the Blackburn school and provide a visitor orientation site that would be obviously available to visitors departing the shuttle vans. A visitor orientation site that would provide visitors with information about the NHL and surrounding area (including opportunities provided by private businesses) would greatly enhance the visitor experience.

With full stabilization of the concentration mill/tram terminus, the exterior and interior of the building would be preserved over time. A stabilized mill building provides a guided tour opportunity and enhances the visitor experience. Under this alternative, stabilization efforts would continue and most of the historic structures identified in Table 4-2 would be stabilized and available for exterior or interior interpretation. This represents an opportunity for visitors to access or see the historic structures that are significant components of the cultural landscape of the site.

Historic circulation routes would be maintained or enhanced. These routes would serve as pedestrian trails and provide easy access around the core of the NHL and a sense to the visitor of the cultural landscape. A pedestrian trail would be developed on the east side of the Kennecott glacier and a walk-in campground would be developed. These are developments that would provide day-hiking opportunities and alternatives to the dispersed camping situation that currently exists. Vegetation clearing on the lower portion of the aerial tramway would highlight an important historical feature linking the mines to the concentration mill.

With a cooperative community/NPS effort at educating the visiting public regarding motorized access to the NHL, visitors arriving via off-road vehicles and/or motorcycles would decrease. Decreased motorized

use by visitors on the state right-of-way between McCarthy and Kennecott, on area trails, and on millsite subdivision easements would minimize user conflicts, safety issues, trespass, and would enhance from the average visitor's experience. Management of parking in the NHL (through limited designated sites and no parking in the easements) would minimize haphazard parking throughout the site and would have a positive impact on the visitor experience.

An additional vault toilet at the start of the Root Glacier trail and re-location of the existing Jumbo creek outhouse would result in less chance of a day hiker or dispersed camper encountering human waste and/or toilet paper.

Negative effects to visitor experience associated with this alternative include the noise and activity associated with construction and stabilization projects. These projects sometimes result in temporary closure of historic structures to the visiting public.

Overall, implementation of this alternative would result in an improvement to visitor use and experience.

Cumulative Impacts: Same as described for Alternative 1.

Conclusion: This alternative proposes actions that would have a positive effect on visitor experience. This alternative works towards and is consistent with accomplishing the action items identified in the 2011 Interpretive Concept Plan.

4.8.4 Alternative 3, Management Concepts

Direct and Indirect Effects: Under this alternative, no new water system would be installed. Without additional potable water, a sprinkler system, and additional improvements to the Company store, the Blackburn school could not be vacated as office space and converted into a visitor orientation station. No improvements would be made over the current situation to improve the visitor's sense of arrival and orientation. Without a new water system, flush toilets would not be installed in the Company Store and visitors would continue to rely on the vault toilets currently provided. Without an enhanced water system, opportunities for adaptive re-use and partnership with the West Bunkhouse would be very limited.

Without additional improvements to the Company Store, there would be no opportunity to develop a central exhibit in the building. There would be no improvement to the visitor experience over the existing situation.

With full stabilization of the concentration mill/tram terminus, the building would remain as the iconic historic structure in the NHL. This alternative does not propose exterior improvements such as window replacement and painting, so the exterior appearance of the building would remain unchanged. Stabilization and maintenance of this historic structure provides interpretive opportunities, enhances the visitor experience, and provides a guided tour opportunity. Under this alternative, interior and foundation stabilization efforts would continue and most historic structures would remain in place. Maintenance of these structures provides an opportunity for visitors to access or see the historic structures that are significant components of the cultural landscape of the site.

Historic circulation routes would not be maintained or enhanced. Continued vegetation encroachment would make these hard to identify for the average visitor, thus decreasing potential opportunities for visitors. A pedestrian trail would be developed on the east side of the Kennecott glacier and a walk-in campground would be developed. These are developments that would provide day-hiking opportunities and alternatives to the dispersed camping situation that currently exists. This alternative also proposes the construction of 4 miles of additional pedestrian trails in the area. The intent of these pedestrian trails is to minimize conflicts with existing local and visitor motorized use. These pedestrian trails would provide additional day-hiking opportunities for visitors and locals alike, and would enhance the visitor experience.

With a cooperative community/NPS effort at educating the visiting public regarding motorized access to the NHL, visitors arriving via off-road vehicles and/or motorcycles would decrease. Decreased motorized use by visitors on the state right-of-way between McCarthy and Kennecott, on area trails, and on millsite subdivision easements would minimize user conflicts, safety issues, trespass, and would enhance from the average visitor's experience. Management of parking in the NHL (through limited designated sites and no parking in the easements) would minimize haphazard parking throughout the site and would have a positive impact on the visitor experience.

An additional vault toilet at the start of the Root Glacier trail and re-location of the existing Jumbo creek outhouse would result in less chance of a day hiker or dispersed camper encountering human waste and/or toilet paper.

Cumulative Impacts: Same as described under Alternative 1.

Conclusion: The Management Concepts alternative proposes some actions that would result in a positive effect on visitor experience. This alternative is not consistent with accomplishing action items identified in the 2011 Interpretive Concept Plan.

4.8.5 Alternative 4, Restoration

Direct and Indirect Effects: Under this alternative, a water system would be installed providing potable water and limited fire suppression (sprinkler systems in occupied buildings). Proposed improvements to the Company store would facilitate the movement of office space from the Blackburn school and conversion to the Blackburn school to a visitor orientation site. The Company store would house a central exhibit, and proposed flush toilets would be available to the public. At the Blackburn school, the back porch would be extended to the south to provide a tie-in with the shuttle turnaround. This would provide a link between the existing shuttle turnaround and the Blackburn school and provide a visitor orientation site that would be obviously available to visitors departing the shuttle vans. A visitor orientation site that would provide visitors with information about the NHL and surrounding area (including opportunities provided by private businesses) would greatly enhance the visitor experience.

With full stabilization of the concentration mill/tram terminus, the exterior and interior of the building would be preserved over time. A stabilized mill building provides a guided tour opportunity and enhances the visitor experience. This alternative proposes full restoration of the Administrative Core and Industrial Core zones of the NHL, including full restoration of historic structures that no longer exist (Stephen Birch house, superintendent's house). Stabilization and restoration efforts would ensure that most of the historic structures identified in Table 4-4 would be available for exterior or interior interpretation and visitor access. This represents an enhanced opportunity for visitors to access or see the historic structures that are significant components of the cultural landscape of the site.

Extensive vegetation clearing would be done in the Industrial and Administrative Core zones, in order to replicate 1938 conditions. Clearing to this extent, while allowing the best opportunity for visitors to get a sense of the historic landscape, would negatively affect visitors sense of being at a place "carved out of the wilderness."

Historic circulation routes would be maintained, enhanced, or restored. These routes would serve as pedestrian trails and provide easy access around the core of the NHL and a sense to the visitor of the cultural landscape. A pedestrian trail would be developed on the east side of the Kennecott glacier and a walk-in campground would be developed. These are developments that would provide day-hiking opportunities and alternatives to the dispersed camping situation that currently exists. Vegetation clearing on the lower portion of the aerial tramway would highlight an important historical feature linking the mines to the concentration mill.

With a cooperative community/NPS effort at educating the visiting public regarding motorized access to the NHL, visitors arriving via off-road vehicles and/or motorcycles would decrease. Decreased motorized use by visitors on the state right-of-way between McCarthy and Kennecott, on area trails, and on millsite subdivision easements would minimize user conflicts, safety issues, trespass, and would enhance from the average visitor's experience. Management of parking in the NHL (through limited designated sites and no parking in the easements) would minimize haphazard parking throughout the site and would have a positive impact on the visitor experience.

An additional vault toilet at the start of the Root Glacier trail and re-location of the existing Jumbo creek outhouse would result in less chance of a day hiker or dispersed camper encountering human waste and/or toilet paper.

Cumulative Impacts: Same as described for Alternative 1.

Conclusion: This alternative proposes actions that would have a positive effect on visitor experience. This alternative works towards and is consistent with accomplishing the action items identified in the 2011 Interpretive Concept Plan.

4.9 Transportation and Access

4.9.1 Alternative 1, No Action

Direct and Indirect: This alternative does not propose any actions that would have an effect, positive or negative, on visitor or local access to the NHL.

Cumulative Effects: The following reasonably foreseeable actions could have an effect on transportation and access:

Change in operation of privately owned shuttle services: Local businesses currently provide van shuttles for visitors. If these local businesses stopped providing the service, a visitor's ability to access the NHL would be seriously compromised. A change in business operators of these van services could affect access to the site in terms of reliability or cost.

Privately-owned bridge across the Kennecott river: This bridge allows vehicle access at all times of the year, for a fee. Construction and operation of the bridge has had a major effect on transportation and access to McCarthy and Kennecott. It has had a major impact on the ability of local businesses to efficiently operate and on NPS to haul material for historic structure stabilization. If this bridge changed hands or washed out, it would be a major impact to area transportation and access.

Off Road Vehicle use on the Kennecott footbridge and the State ROW between McCarthy and Kennecott: As discussed in section 3.8.3 of this document (page 73), there are legal restrictions against ORV use on the Kennecott footbridge and the State ROW between McCarthy and Kennecott. These restrictions are not currently enforced. If an action occurred (such as an accident or community pressure) that prompted the state (Alaska State Troopers) to start enforcing these statutes, it would have a major impact on local access to McCarthy and Kennecott.

Road improvements: Improvements to the McCarthy Road and the state ROW between McCarthy and Kennecott have the potential to increase visitation to the area and to increase interest in purchase and development of private lots in the area.

The listed reasonably foreseeable actions have the potential to have a major impact on how visitors and local residents access McCarthy and/or Kennecott. Whether those impacts are positive or negative depends on an individual's perception.

Conclusion: Direct and indirect effects of this alternative would have a negligible effect on visitor and local resident access. Combined with reasonably foreseeable actions, there is the potential for a major impact on area access.

4.9.2 Alternative 2, Preferred Alternative

Direct and Indirect: This alternative proposes cooperative community/NPS educational efforts targeted at informing visitors that Kennecott is a non-motorized visitor destination, with limited parking. Visitor access will be affected through an informed choice on the part of the visitor and by the physical limitations to motorized travel that exist at McCarthy/Kennecott. Direct and indirect effects of this alternative on visitor access would be minor.

This alternative proposes that the NPS owned portion of the Kennecott Glacier road will be designated a park road, open to motorized use. Motorized travel on NPS lands off the designated road will only be allowed for federally qualified subsistence users engaged in subsistence activities. While this will result in some restriction of the wide-open scenario that currently exists, local residents will still be able to access the area in a reasonable fashion. Direct and indirect effects of this alternative on local access will be minor.

This alternative proposes to maintain existing circulation routes and to construct a 3.5 mile pedestrian trail along the east side of the Kennicott glacier. Maintaining and/or constructing these as pedestrian trails will enhance day-hiking opportunities and access in the area.

Cumulative Effects: Same as described for Alternative 1.

Conclusion: Direct and Indirect effects of Alternative 2 on visitor and local access would be minor. Cumulatively with reasonably foreseeable actions, impacts could be major.

4.9.3 Alternative 3, Management Concepts

Direct and Indirect: This alternative proposes cooperative community/NPS educational efforts targeted at informing visitors that Kennecott is a non-motorized visitor destination, with limited parking. Visitor access will be affected through an informed choice on the part of the visitor and by the physical limitations to motorized travel that exist at McCarthy/Kennecott. Direct and indirect effects of this alternative on visitor access would be minor.

This alternative proposes that the NPS owned portion of the Kennecott Glacier road will be designated a park road, open to motorized use. Motorized travel on NPS lands off the designated road will only be allowed for federally qualified subsistence users engaged in subsistence activities. While this will result in some restriction of the wide-open scenario that currently exists, local residents will still be able to access the area in a reasonable fashion. Direct and indirect effects of this alternative on local access will be minor.

This alternative proposes to maintain existing circulation routes and to construct a 3.5 mile pedestrian trail along the east side of the Kennicott glacier. This alternative would also include the construction of 4 miles of additional pedestrian trail in the area. Maintaining and/or constructing these as pedestrian trails would enhance day-hiking opportunities area and minimize motorized/pedestrian conflicts.

Cumulative Effects: Same as described for Alternative 1.

Conclusion: Direct and Indirect effects of Alternative 3 on visitor and local access would be minor. Cumulatively with reasonably foreseeable actions, impacts could be major.

4.9.4 Alternative 4, Restoration

Direct and Indirect, Cumulative, and Conclusion all the same as alternative 2.

4.10 Soundscape

4.10.1 Alternative 1, No Action

Direct and Indirect: Under this alternative, stabilization of historic structures would not continue. NPS maintenance crew would be minimized to conduct cyclic maintenance on stabilized or adaptive re-use historic structures. This would minimize noise associated with contracts and stabilization efforts (sounds identified as "construction", "4-wheeler", "heavy equipment", "footsteps", "truck/van", and "voices" in section 3.9.3). This alternative proposes nothing to minimize maintenance crew commute noise, but this impact would be off-set by the fact that the maintenance crew would be much reduced in size.

Noises associated with visitor use (shuttle vans, 4-wheelers, motorcycles, voices, footsteps) would continue. This alternative does not take actions to educate visitors about coming to the NHL in a non-motorized fashion and it proposes nothing to address parking. Noise associated with individual visitors coming in a motorized fashion (on 4-wheelers or motorcycles) would be expected to increase. To local residents and visitors to the Kennecott mill town, these impacts would be temporary, high intensity to an important park resource. Outside of the Kennecott mill town, impacts would be negligible.

This alternative would have the least direct and indirect impact on natural soundscapes due to the cessation of stabilization work. Impacts described above would result in a minor impact to the soundscape within the Kennecott mill town.

Cumulative Impacts: The following reasonably foreseeable actions would have an impact on the natural soundscape:

Private lots in the Kennecott area: Private lots may change hands and currently undeveloped lots may be developed. Private development and existing homes/businesses can impact natural soundscape in several ways: 1) Motorized access; 2) construction activities associated with home or business construction or improvement; 3) generator noise; and 4) voices or barking dogs.

Increase in backcountry visitors/flightseers: Sounds associated with small planes (audible 5 – 30 % of the time, according to data presented in section 3.9.3) would be expected to increase.

These impacts vary from temporary to long-term and vary in intensity from low to medium. Impacts to the natural soundscape associated with these reasonably foreseeable actions would be moderate.

Conclusion: NPS stabilization efforts and visitor management occur amidst the communities of Kennecott and McCarthy. There are sounds associated with private homes and businesses that have a moderate impact on the natural soundscape and would occur regardless of NPS activities. This alternative, because of the cessation of stabilization efforts, would have the least direct and indirect impact on the natural soundscape and would result in a minor impact to soundscape within the Kennecott mill town.

4.10.2 Alternative 2, Preferred Alternative

Direct and Indirect: Under this alternative, stabilization of historic structures would continue. NPS maintenance crew and or contractors would continue major stabilization projects for the next five years. After that, work would taper off to the point of cyclic maintenance. Noise associated with contracts and stabilization efforts (sounds identified as "construction", "4-wheeler", "heavy equipment", "footsteps",

"truck/van", and "voices" in section 3.9.3) would continue, an impact to the natural soundscape of temporary nature but high intensity.

This alternative proposes designated parking for NPS employees and contractors and a better employee shuttle system. This would minimize the noise associated with daily commutes, which is a contributor to existing non-natural noise levels (see section 3.9.3).

Noises associated with visitor use (shuttle vans, 4-wheelers, motorcycles, voices, footsteps) would continue. Actions would be taken to educate visitors about coming to the NHL in a non-motorized fashion and designation of limited visitor parking. Noise associated with individual visitors coming in a motorized fashion (on 4-wheelers or motorcycles) would be expected to decrease over time.

Because of the continued stabilization efforts over the next five years, this alternative would have more direct and indirect impact on natural soundscapes than alternatives 1 or 3. For visitors and local residents within the Kennecott mill town, these impacts would be long-term (5 – 10 years) and high intensity, resulting in a moderate impact to soundscapes within the milltown. Outside the milltown, backcountry visitors would experience negligible impacts to the natural soundscape.

Cumulative Impacts: Same as described for Alternative 1.

Conclusion: NPS stabilization efforts and visitor management occur amidst the communities of Kennecott and McCarthy. There are sounds associated with private homes and businesses that have a moderate impact on the natural soundscape and would occur regardless of NPS activities. This alternative, because of the continuation of stabilization efforts over the next five years, would have more direct and indirect impact on the natural soundscape than alternatives 1 or 3.

4.10.3 Alternative 3, Management Concepts

Direct and Indirect: Under this alternative, stabilization of historic structures would continue. The major difference between this alternative and alternative 2 is that there would be less exterior finish to stabilized buildings (painting, window replacement, siding replacement). Noise associated with contracts and stabilization efforts (sounds identified as "construction", "4-wheeler", "heavy equipment", "footsteps", "truck/van", and "voices" in section 3.9.3) would continue, an impact to the natural soundscape of temporary nature but high intensity. These impacts would be at a level slightly lower than alternative 2.

This alternative proposes designated parking for NPS employees and contractors and a better employee shuttle system. This would minimize the noise associated with daily commutes, which is a contributor to existing non-natural noise levels (see section 3.9.3).

Noises associated with visitor use (shuttle vans, 4-wheelers, motorcycles, voices, footsteps) would continue. Actions would be taken to educate visitors about coming to the NHL in a non-motorized fashion and designation of limited visitor parking. Noise associated with individual visitors coming in a motorized fashion (on 4-wheelers or motorcycles) would be expected to decrease over time.

Because of the continued stabilization efforts over the next five years but less emphasis on exterior finish, this alternative would have more direct and indirect impact on natural soundscapes than alternatives 1, less than alternatives 2 or 4. To local residents and visitors to the Kennecott milltown, the impacts described above would be long-term (5 year) and high intensity, resulting in a moderate impact to soundscape within the Kennecott milltown. For backcountry visitors, impacts to the natural soundscape would be negligible.

Cumulative Impacts: Same as described for Alternative 1.

Conclusion: NPS stabilization efforts and visitor management occur amidst the communities of Kennecott and McCarthy. There are sounds associated with private homes and businesses that have a moderate impact on the natural soundscape and would occur regardless of NPS activities. This alternative, because of the continuation of stabilization efforts over the next five years but less emphasis on exterior finish and restoration of small scale features, would have less direct and indirect impact on the natural soundscape than alternatives 2 or 4.

4.10.4 Alternative 4, Restoration

Direct and Indirect: Under this alternative, stabilization of historic structures would continue and restoration of buildings that no longer exist would occur. Noise associated with contracts, stabilization efforts, restoration of structures, and extensive restoration of small scale features, would continue for the next ten years at least. These impacts to the natural soundscape would be temporary to long-term in nature and high intensity.

This alternative proposes extensive clearing of vegetation in order to replicate 1938 conditions. This would require extensive chain saw work and follow-up maintenance to maintain the appearance. This would be a temporary but high intensity impact on the natural soundscape.

This alternative proposes designated parking for NPS employees and contractors and a better employee shuttle system. This would minimize the noise associated with daily commutes, which is a contributor to existing non-natural noise levels (see section 3.9.3).

Noises associated with visitor use (shuttle vans, 4-wheelers, motorcycles, voices, footsteps) would continue. Actions would be taken to educate visitors about coming to the NHL in a non-motorized fashion and designation of limited visitor parking. Noise associated with individual visitors coming in a motorized fashion (on 4-wheelers or motorcycles) would be expected to decrease over time.

Because of the intensive stabilization and restoration efforts over the next ten years, this alternative would have more direct and indirect impact on natural soundscapes due than any other alternative. Local residents and Kennecott milltown visitors would experience long term (10 year), high intensity impacts that would result in a moderate impact to soundscape within the milltown. Backcountry visitors would experience negligible impacts to the natural soundscape.

Cumulative Impacts: Same as described for Alternative 1.

Conclusion: NPS stabilization efforts and visitor management occur amidst the communities of Kennecott and McCarthy. There are sounds associated with private homes and businesses that have a moderate impact on the natural soundscape and would occur regardless of NPS activities. Because of the intensive stabilization and restoration efforts over the next ten years, this alternative would have more direct and indirect impact on natural soundscapes due than any other alternative.

4.11 Socioeconomics

4.11.1 Alternative 1, No Action

Direct and Indirect: Under this alternative, stabilization of historic structures would not continue. NPS maintenance crew would be minimized to conduct cyclic maintenance on stabilized or adaptive re-use historic structures. This would represent a loss of 16 seasonal jobs or an annual loss of $280,000 dollars in wages.

Without proposed stabilization work on the concentration mill, mill tours through the interior of the building would eventually be deemed unsafe and halted. This would represent a loss of economic

opportunity for a local business. Visitors have indicated that historic structure stabilization and improvement of visitor services would add to the quality of the visitor experience (NPS, 2005). Consequently, this alternative would do little to encourage repeat visitors. However, visitation to the area and related local economic benefits are also dependent on other factors in the area (see cumulative effects).

Because of the loss of seasonal wages that would occur, this alternative would have a moderate negative effect on area socioeconomics.

Cumulative Impacts: The following reasonably foreseeable actions would have an impact on socioeconomics:

Private lots and development in the Kennecott/McCarthy area: Private lots may change hands and currently undeveloped lots may be developed. An increase in seasonal homes in the area would result in an increase in use of local businesses, particularly construction, food and/or alcohol service, and groceries.

Changes in access to the area: Improvements to the McCarthy Road, changes in motorized access over the Kennicott river, and/or improvements to the road from McCarthy to Kennecott all have the potential to influence the trend in area visitation. These factors also have a major effect on the efficiencies, cost effectiveness, and profitability of local businesses. Changes to area access have the potential to have a major impact on area socioeconomics.

Conclusion: The loss of seasonal jobs in the area would result in a moderate negative effect on area socioeconomics. Cumulative impacts listed above have more potential to influence area socioeconomics than NPS actions.

4.11.2 Alternative 2, Preferred Alternative

Direct and Indirect: Under this alternative, stabilization of historic structures would continue. NPS maintenance crew and or contractors would continue major stabilization projects for the next five years. After that, work would taper off to the point of cyclic maintenance. Seasonal wages would continue at current levels for the next five years, then would be reduced to approximately 25% of current levels. This would represent a minor long-term negative impact to area socioeconomics.

With stabilized historic structures, NPS would continue with a concession town tour, featuring the mill building, leach plant, power plant, and other structures. This represents a continued economic opportunity for at least one local business. Stabilized historic structures and improved visitor services would encourage new and repeat visitors. NPS would expect an increasing trend in visitation to the NHL, with resulting benefits to local businesses.

Cumulative Impacts: Same as described for Alternative 1.

Conclusion: Long term loss of seasonal employment opportunities in the area would have a minor negative effect on area socioeconomics. Expected increase in visitor use would benefit local businesses. Cumulative impacts listed under Alternative 1 have more potential to influence area socioeconomics than NPS actions.

4.11.3 Alternative 3, Management Concepts

Direct and Indirect: Same as Alternative 2.

Cumulative Impacts: Same as described for Alternative 2.

Conclusion: Same as described for Alternative 2.

4.11.4 Alternative 4, Restoration

Direct and Indirect: Under this alternative, stabilization of historic structures would continue and restoration of buildings that no longer exist would occur. Major stabilization and restoration of historic structures would occur for at least the next 10 years. Seasonal employment opportunities and wages would be available at least at current levels. This would provide a continued benefit to area socioeconomics.

Intensive restoration efforts and improvement of visitor services proposed under this alternative would likely result in an upward trend in area visitation. This would provide a direct benefit to area businesses. A mill town tour concession would continue to provide an economic opportunity for at least one local business.

Cumulative Impacts: Same as described for Alternative 1.

Conclusion: Actions proposed under this alternative would have a minor beneficial effect to area socioeconomics. Cumulative impacts listed under Alternative 1 have more potential to influence area socioeconomics than NPS actions.

5.0 Consultation and Coordination

5.1 Public Involvement

Public involvment for the Kennecott Operations Plan began on September 8, 2010 with a public meeting in Kennecott. The general planning process and timelines were explained and public concerns and comments were noted.

On December 13, 2010, a scoping letter went out to 210 people and organizations. It formally announced the scoping period for the Kennecott Operations Plan, explained the purpose of the Plan, and invited comments. The park also posted the letter on the NPS Planning, Environment, and Public Comment (PEPC) website for public review and comment. The park asked for comments by January 31, 2012 and received comments from the McCarthy Area Council (MAC), National Parks Conservation Association, State of Alaska, Friends of Kennicott, Alaska Quiet Rights Coalition, and several individuals. Additionally, a public meeting was held in Anchorage on February 23, 2011. The meeting included a presentation by the NPS Regional Historical Architect and an explanation of the planning process. Questions, comments, and concerns were noted.

In March of 2011, the park Interdisciplinary Team (IDT) met for three days to review public comment and develop a proposed action package for the Kennecott Mines National Historic Landmark. Proposals included historic structure stabilization/preservation, interpretation, NPS utilities and infrastructure, transportation/access, vegetation management, and management of small scale features and archeological resources. The IDT also discussed a protocol for communications with the McCarthy/Kennecott community. The resulting proposed action package was made available to the McCarthy/Kennecott community and posted on the PEPC website for public review and comment in May, 2011. NPS asked for comments by August 31, 2011.

To facilitate review of the proposed action package, the McCarthy Area Council assigned a sub-committee to thoroughly review and comment on the document. Additionally, NPS held three public meetings in Kennecott/McCarthy during the course of the summer to answer any questions regarding the proposed action package. The community requested and was granted an extension on the comment period to September 15, 2011.

NPS received 31 written comment letters on the Proposed Action for Management of Kennecott Mines National Historic Landmark. These included a MAC subcommittee re-write, which was signed or otherwise endorsed by 43 individuals. Friends of Kennicott also submitted a comment letter, generally supporting and supplementing the MAC subcommittee re-write. Comments were received from several other organizations or agencies, including Alaska Quiet Rights Coalition, the State of Alaska, and National Parks Conservation Association.

The IDT met again in October 2011 to review the public comments and modify the proposed action package, based on public comment. The modified version of that proposed action package is the basis for the proposed action identified in this Environmental Assessment.

During the summer of 2012, two public workshops were held in Kennecott to facilitate public input into the planning process. The first was held in June, co-hosted with the Friends of Kennecott, and included discussions of the management concepts, NHPA process, and Secretary of the Interior's Standards for Treatment of Historic Properties. The second was a 4-night session held in July and included discussions on parking, the shuttle turnaround, and vehicle access to the Kennecott mill town. These sessions were well-attended by individuals and area businesses. Conclusions from both public sessions were incorporated into the preferred alternative of the Kennecott Operations Plan Environmental Assessment. This EA represents one of numerous opportunities for public involvement in the planning process.

5.2 List of Preparers and Contributors

The following is a list of preparers of this document and key contributors. These individuals and organizations assisted in identifying issues and developing alternatives.

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